A COMPARATIVE STUDY OF PLASMA FIBRINOGEN IN MALE AND FEMALE PATIENTS WITH CORONARY ARTERY DISEASE

Dissertation submitted to

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

CHENNAI.

In partial fulfillment of the regulations for the award of the degree of

DOCTOR OF MEDICINE

BRANCH I – M.D., GENERAL MEDICINE

APRIL 2016

DEPARTMENT OF MEDICINE

TIRUNELVELI MEDICAL COLLEGE & HOSPITAL

TIRUNELVELI 627011, TAMILNADU

CERTIFICATE

This is to certify that the dissertation entitled "**A COMPARATIVE STUDY OF PLASMA FIBRINOGEN IN MALE AND FEMALE PATIENTS WITH CORONARY ARTERY DISEASE**" submitted by **Dr.N.SOUNTHARYA** to the Tamil Nadu Dr. M.G.R. Medical University, Chennai, in partial fulfilment of the requirement for the award of M.D. degree Branch I (General Medicine) is a bonafide research work carried out by her under my strict supervision and guidance. This dissertation partially or fully has not been submitted for any other degree or diploma of this university or other.

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PROTOCOL TITLE: A COMPARATIVE STUDY OF PLASMA FIBRINOGEN IN MALE AND FEMALE PATIENTS WITH CORONARY ARTERY DISEASE.

NAME OF PRINCIPAL INVESTIGATOR: Dr. N.Sountharya, MBBS.,
DESIGNATION OF PRINCIPAL INVESTIGATOR: Post Graduate in MD General Medicine
DEPARTMENT & INSTITUTION: Department of General Medicine, Tirunelveli Medical College

Dear Dr. N.Sountharya, *The Tirunelveli Medical College Institutional Ethics Committee (TIREC) reviewed and discussed your application during the IEC meeting held on 14.05.14.*

THE FOLLOWING DOCUMENTS WERE REVIEWED AND APPROVED

1.	TIREC Application Form	☐
2.	Study Protocol	☐
3.	Department Research Committee Approval	☐
4.	Patient Information Document and Consent Form in English and Vernacular Language	☐
5.	Investigator's Brochure	☐
6.	Proposed Methods for Patient Accrual Proposed	☐
7.	Curriculum Vitae of the Principal Investigator	☐
8.	Insurance /Compensation Policy	☐
9.	Investigator's Agreement with Sponsor	☐
10.	Investigator's Undertaking	☐
11.	DCGI/DGFT approval	☐
12.	Clinical Trial Agreement (CTA)	☐
13.	Memorandum of Understanding (MOU)/Material Transfer Agreement (MTA)	☐
14.	Clinical Trials Registry-India (CTRI) Registration	☐

THE PROTOCOL IS APPROVED IN ITS PRESENTED FORM ON THE FOLLOWING CONDITIONS

1. The approval is valid for a period of 2 year/s or duration of project whichever is later
2. The date of commencement of study should be informed
3. A written request should be submitted 3weeks before for renewal / extension of the validity
4. An annual status report should be submitted.
5. The TIREC will monitor the study
6. At the time of PI's retirement/leaving the institute, the study responsibility should be transferred to a person cleared by HOD
7. The PI should report to TIREC within 7 days of the occurrence of the SAE. If the SAE is Death, the Bioethics Cell should receive the SAE reporting form within 24 hours of the occurrence.
8. In the events of any protocol amendments, TIREC must be informed and the amendments should be highlighted in clear terms as follows:
    a. The exact alteration/amendment should be specified and indicated where the amendment occurred in the original project. (Page no. Clause no. etc.)
    b. The PI must comment how proposed amendment will affect the ongoing trial. Alteration in the budgetary status, staff requirement should be clearly indicated and the revised budget form should be submitted.
    c. If the amendments require a change in the consent form, the copy of revised Consent Form should be submitted to Ethics Committee for approval. If the amendment demands a re-look at the toxicity or side effects to patients, the same should be documented.
    d. If there are any amendments in the trial design, these must be incorporated in the protocol, and other study documents. These revised documents should be submitted for approval of the IEC, only then can they be implemented.
    e. Approval for amendment changes must be obtained prior to implementation of changes.
    f. The amendment is unlikely to be approved by the IEC unless all the above information is provided.
    g. Any deviation/violation/waiver in the protocol must be informed

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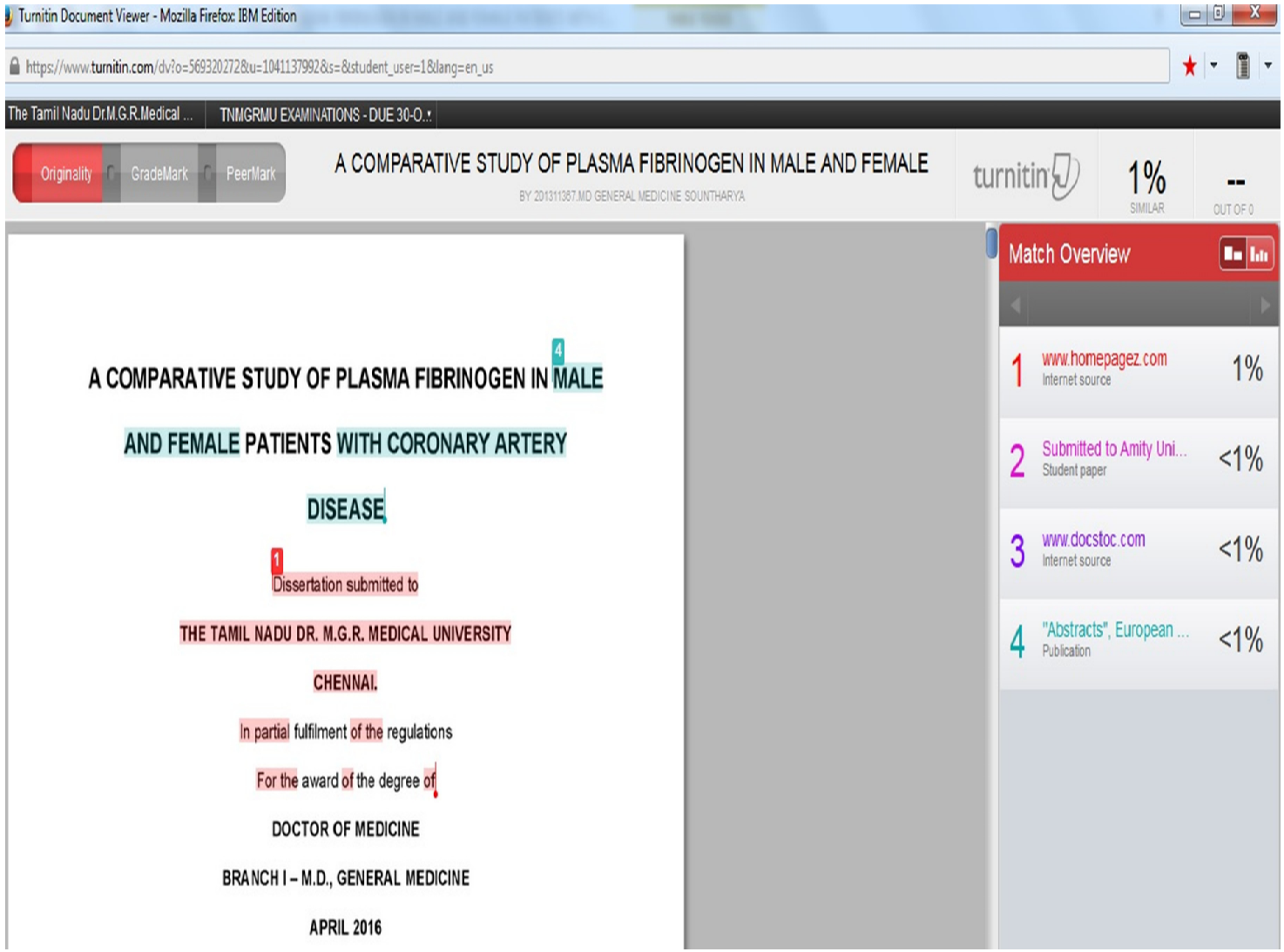
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DECLARATION

I, **DR. N.SOUNTHARYA**, solemnly declare that this dissertation entitled, "**A COMPARATIVE STUDY OF PLASMA FIBRINOGEN IN MALE AND FEMALE PATIENTS WITH CORONARY ARTERY DISEASE**" is a bonafide work done by me at Tirunelveli Medical College Hospital from August 2014 to August 2015 under the supervision and guidance of my unit Chief, H.O.D of General Medicine, **Prof**. **Dr.M.R.VAIRAMUTHU RAJU M.D**.,

This dissertation is submitted to the Tamil Nadu Dr. M.G.R. Medical University, in partial fulfilment of regulation for the award of M.D. degree in General Medicine. This dissertation partially or fully has not been submitted for any other degree or diploma of this university or other.

PLACE: TIRUNELVELI

DATE:

(**DR.N.SOUNTHARYA**)

POST GRADUATE
M.D. GENERAL MEDICINE
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ACKNOWLEDGEMENTS

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With the deep sense of indebtedness and reverence, I thank

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Last but not the least, my sincere thanks to all the patients who co-operated for this study without whom this study could not have been undertaken and to all my colleagues who helped me and shared their knowledge about the study.

ABSTRACT

TITLE

A COMPARATIVE STUDY OF PLASMA FIBRINOGEN IN MALE AND FEMALE PATIENTS WITH CORONARY ARTERY DISEASE

BACKGROUND

Coronary artery disease is the largest killer in developed countries and is rapidly becoming one in developing countries. Conventional risk factors do not explain all cases of coronary artery disease. The increasing risk of coronary artery disease among young suggests the possible role of non-conventional risk factors.

In recent years, the role of plasma fibrinogen as an independent cardiovascular risk factor has been increasingly recognized. Thrombosis, endothelial dysfunction and inflammation are recognized as mechanism of atherosclerotic complications. Fibrinogen is a major determinant of fibrin formation, blood viscosity and platelet aggregation and thus enhances the thrombogenic tendency.

There is paucity of data on the emerging risk factors for coronary artery disease in Indian population especially women. Hence this present study is undertaken to evaluate the association of plasma fibrinogen in coronary artery disease patients.

OBJECTIVE

To estimate the level of plasma fibrinogen in both male and female patients presenting with acute myocardial infarction and to assess the association between plasma fibrinogen and coronary artery disease and compare between male and female patients.

MATERIALS AND METHODS

SOURCE OF DATA

- Cases for the present study were selected randomly from the inpatients of ICCU ward, and male and female medical wards admitted with acute myocardial infarction, in Tirunelveli medical college hospital, Tirunelveli.

PERIOD OF STUDY

- August 2014 to August 2015

STUDY DESIGN

- ❖ Prospective cross sectional study.

SAMPLE SIZE

- ❖ 70 patients, 35 Males and 35 Females

METHOD OF STUDY

An informed consent taken from all subjects of the study. A detailed clinical history was taken and a thorough clinical examination and the required laboratory investigations were done. CPK-MB, Troponin-T, ECG, Plasma fibrinogen were taken in all subjects.

The details collected from each patient was entered in the proforma. The data were analyzed and the results were compared.

RESULT

In this study of 70 patients involving 35 males, 35 females it was found that plasma fibrinogen levels were high in both male and female patients with coronary artery disease and the association was found to be statistically significant.

CONCLUSION

The findings from our study provide evidence that plasma fibrinogen is associated with excess risk of CAD in women. But, the association between plasma fibrinogen and cardiovascular risk does not establish a cause-effect relationship.

Further large scale studies are needed to establish the causal relationship of fibrinogen to coronary artery disease in both the sexes.

KEY WORDS: Coronary Artery Disease, Plasma Fibrinogen, Female

CONTENTS

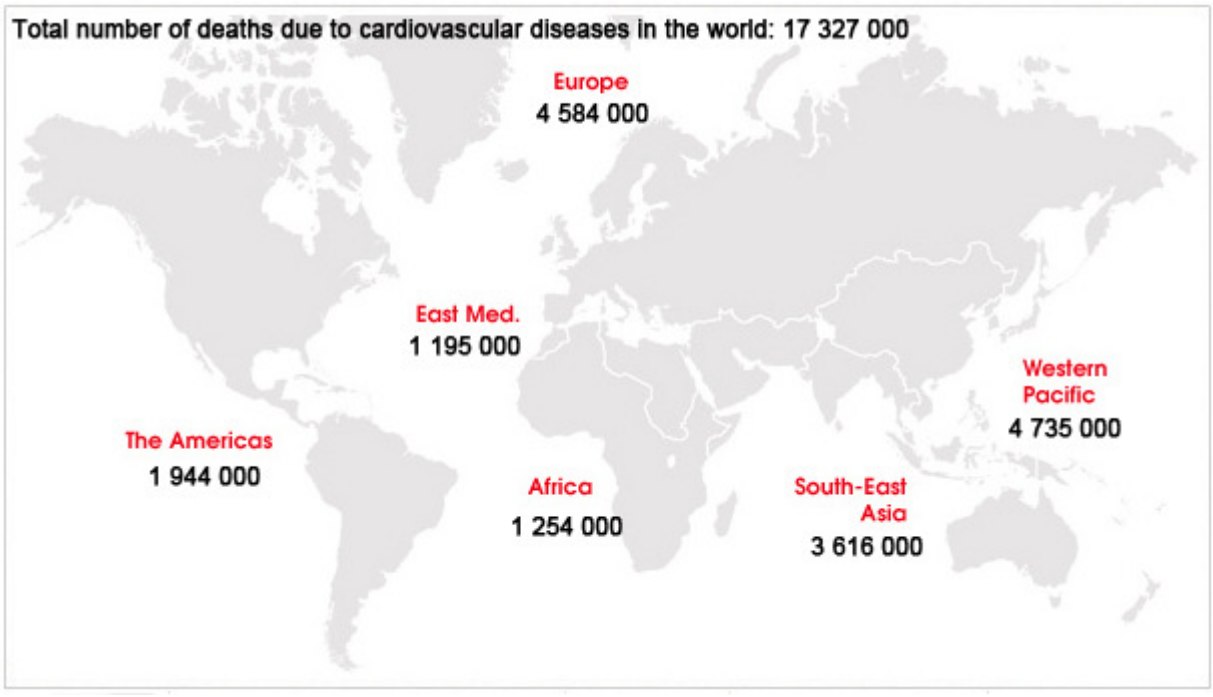
INTRODUCTION

INTRODUCTION

Cardiovascular diseases (CVD) primarily Coronary Artery Disease (CAD) lead the top10 causes of deaths worldwide. It is estimated that one in every two deaths is due to CAD. 17.3 million Deaths were recorded so far. The developing countries, contributes to over 80% of these deaths. One prediction says that by the year 2030, around 23.6 million people will die from cardiovascular diseases (CVD).

Women from the developing countries play a key role in managing the family health. Statistics reveal that 8 out of 10 women are affected by cardio vascular disease. Each year 8.6 million women around the globe die because of cardiovascular disease (CVD). This number is greater than the people who die from all cancers, tuberculosis, HIV/AIDS and other diseases. Around 3.3 million women die because of Myocardial Infarction, 3.2 million women die because of stroke and 2.1 million women die because of heart failure, hypertensive heart disease, inflammatory heart disease, and other CVDs.

The following image shows the total number of deaths due to cardio vascular disease worldwide.



After the 1980s, gender specific trends became evident in these statistics: whereas death due to CAD decreased among men, there is a continuous rise in rates of death from CAD in women.

This difference is due to the fact that CAD was considered a ‘male disease’, and that studies and research concentrated primarily on men. Hence in men, this phenomenon, in addition to improved modern medicine over the past 30 to 40 years with its therapeutic approaches and preventive measures, have led to a

decrease in death rate. The contrary situation in females is due to two factors: that results obtained from research for men are not applicable to women, and/or that women do not enjoy all the advances in diagnosis and therapy.

Moreover, after the 1980s, changes have taken place in the risk factor profile in both women and men. We know today that there are a number of gender specific differences in the development, course, symptom complexes, diagnosis, therapy, and prognosis of CHD. In women, CHD occurs about 10 to 15 years later than in men. Risks drastically increase after menopause, due to decrease of endogenous sexual hormones, especially oestrogens.

Though women are also exposed to the same atherogenic risk factors as men, the significance and the relative weighting of these factors are different. The reasons for these differences are presently unclear. However, enhanced insights into the differences between male and female atherogenic risk factors are essential towards achieving optimal gender-specific disease prevention and therapy.

Inflammation plays an important role in the pathogenesis of atherosclerosis. Studies have shown that markers of inflammation are independent predictors of cardiovascular events. Clinical studies in patients with acute coronary syndromes found highly increased levels of inflammatory markers.

Numerous studies have confirmed Fibrinogen as a major independent risk factor for cardiovascular diseases. Fibrinogen has also been associated with traditional cardiovascular risk factors, suggesting that the elevation of fibrinogen may be a pathway by which these risk factors exert their effect. There are several mechanisms by which fibrinogen may increase cardiovascular risk.

1. It binds specifically to activated platelets via glycoprotein IIb/IIIa, contributing to platelet aggregation.
2. Increased fibrinogen levels promote fibrin formation.
3. It is a major contributor to plasma viscosity.
4. It is an acute-phase reactant that is increased in inflammatory states.

The association between high fibrinogen concentrations and the risk of cardiovascular disease was first reported in the Northwick Park Heart Study in 1980's. Numerous other prospective studies have confirmed a strong and

independent effect of raised plasma fibrinogen on both the onset and the progression of ischaemic heart disease (IHD), stroke and lower extremity arterial disease. The strength of the association is similar to that of cholesterol or blood pressure. Thus, men with plasma fibrinogen concentrations in the upper third of its distribution experience between 2.0 and 2.5 times the incidence of IHD compared with those with values in the lower third.

Further, data from the Framingham Heart Study support and also characterize the association between fibrinogen and cardiovascular disease. First, increased fibrinogen may be a pathway by which the traditional risk factors exert their effect on risk. Second, fibrinogen levels are higher among subjects with prevalent cardiovascular disease. These findings, together with other prospective studies identifying fibrinogen as an independent risk factor, add strength to the proposal that Plasma fibrinogen measurement can assist in the risk stratification of patients at risk of cardiovascular disease.

The Framingham Heart study has also confirmed this relation in women. But apart from this study, the possible relation between plasma fibrinogen and cardio vascular risk in women has been less investigated.

AIMS OF THE STUDY

AIMS OF THE STUDY

- To estimate the plasma fibrinogen level in subjects with acute myocardial infarction.

- To assess the association between plasma fibrinogen and coronary artery disease and compare it between male and female patients.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

India has the most valuable asset, young population. It is now under threat due to rapidly increasing cardiovascular disease (CVD). Indians are more prone to coronary artery disease but conventional risk factors do not explain the high rates of Coronary Artery Disease among Indians. Myocardial infarction is claiming a large number of lives in India. An impressive difference was absence of traditional risk factors in a third of them. Novel risk factors like homocysteine, lipoprotein (a), small LDL particle and fibrinogen may play a significant role in these patients.

One statistics report in India says that myocardial infarction kills 4 people every minute of age between 30 and 50. Around 1000 people of age 30-40 dies due to myocardial infarction every day in India. Word Health organization (WHO) reports says that around 6.3K Indians of age around 35-40, diagnosed with cardiovascular disease (CVD) every day.

Many women die every year from cardiovascular disease than from any other cause, yet women worry more about breast cancer than heart disease. Women with heart disease may present differently than men, have unique underlying

pathophysiologies, and have distinctive risk benefit profiles with commonly accepted therapies.

Heart disease is far more age dependent in women than in men; women with cardiovascular disease are older and have more co morbidities. This fact, in turn, make diagnostic and treatment procedures more problematic in women. In addition, many effective pharmacological strategies are underutilized, and there is a lack of gender-specific date on numerous therapies. The fact that heart disease is on the decline in men but not women highlights our failure to treat this large segment of the population optimally.

The aetiology of atherothrombotic cardiovascular disease is multi-factorial, and several 'risk factors' are recognized to predispose an individual to develop the disease.

These cardiovascular risk factors, which were initially characterized in the Framingham Heart Study, include: age, family history of premature cardiovascular disease, smoking, hypertension, hyperlipidaemia, diabetes, obesity and sedentary lifestyle.

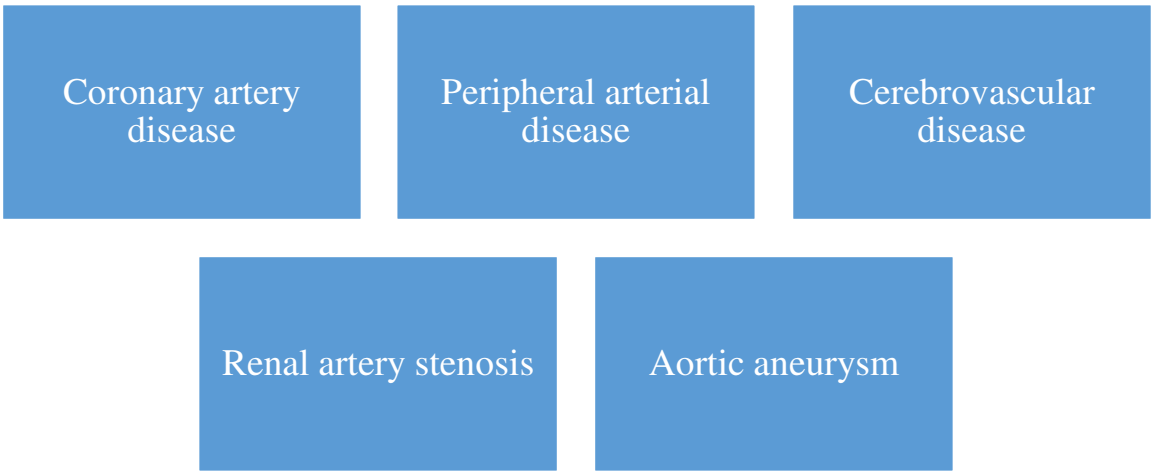
Although a family history of cardiovascular disease is a recognized risk factor, it is important to emphasize that cardiovascular disease is polygenic and numerous genetic abnormalities have been implicated in the development of the final common disease state. Furthermore, expression of disease is often closely linked to environmental risk factors such as smoking, diet and physical inactivity

Clearly, therefore, the 'burden of disease' in a population is strongly associated with the prevalence of recognized risk factors within that population. Incidence and prevalence rates for cardiovascular diseases depend to a large extent on the age profile of the population, socio-economic, dietary and other lifestyle patterns; although other influences, including genetic differences influenced by ethnicity, are also important.

Cardiovascular Disease (CVD)

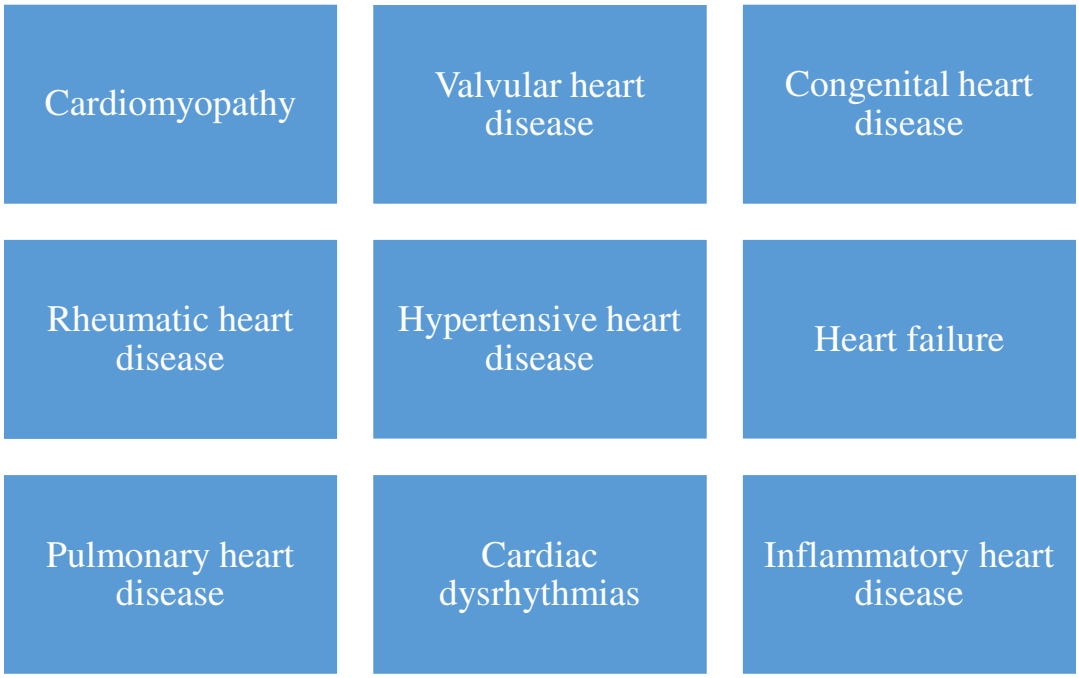
The following chart shows the cardiovascular disease (CVD) that involve blood vessels.

CARDIOVASCUALR DISEASE (CVD) WITH BLOOD VESSELS INVOLVEMENT.



The following chart shows the cardiovascular disease (CVD) that involve heart.

CARDIOVASCUALR DISEASE (CVD) WITH HEART INVOLVEMENT.



The following diseases are falls under cardiovascular disease (CVD) category, they are Coronary artery diseases (CAD) that includes Angina and Myocardial Infarction, Stroke, Hypertensive heart disease, Rheumatic heart disease, Cardiomyopathy, Atrial fibrillation, Congenital heart disease, Endocarditis, Aortic aneurysms, Peripheral artery disease and Venous thrombosis.

CORONARY ARTERY DIESEASE (CAD):

Every day about 3,000 gallons of blood through vessels are pumped by a strong muscular pump, the human heart. Our heart requires a continuous flow of blood supply to function properly. Coronary artery is responsible for feeding the blood to the heart muscles.

The other names for Coronary artery disease (CAD), are ischemic heart disease (IHD), atherosclerotic heart disease, atherosclerotic cardiovascular disease, and coronary heart disease, which includes, stable angina, unstable angina, myocardial infarction, and sudden coronary death. Coronary artery disease (CAD) is one among the diseases in the cardiovascular disease (CVD), but it is the most common disease among them. Symptoms which are common for Coronary artery Disease (CAD) are chest pain or discomfort in the shoulder, arm, back, neck, or jaw. Heartburn will come occasionally.

The World Health Organization (WHO) definition includes the presence of two of the following

1. Symptoms of myocardial infarction
2. Cardiac markers (enzymes) elevated

3. ECG showing characteristic electrocardiographic changes

Newer diagnostic criteria according to the American College of Cardiology and European Society of Cardiology. It requires the presence of one of the following diagnostic criteria to satisfy the diagnosis of acute, evolving or recent myocardial infarction.

1. Typical rise and gradual fall (troponin I/T) or more rapid rise and fall (CK-MBs) of biochemical markers of cardiac muscle necrosis with any one of the following:

a. Symptoms of myocardial ischemia

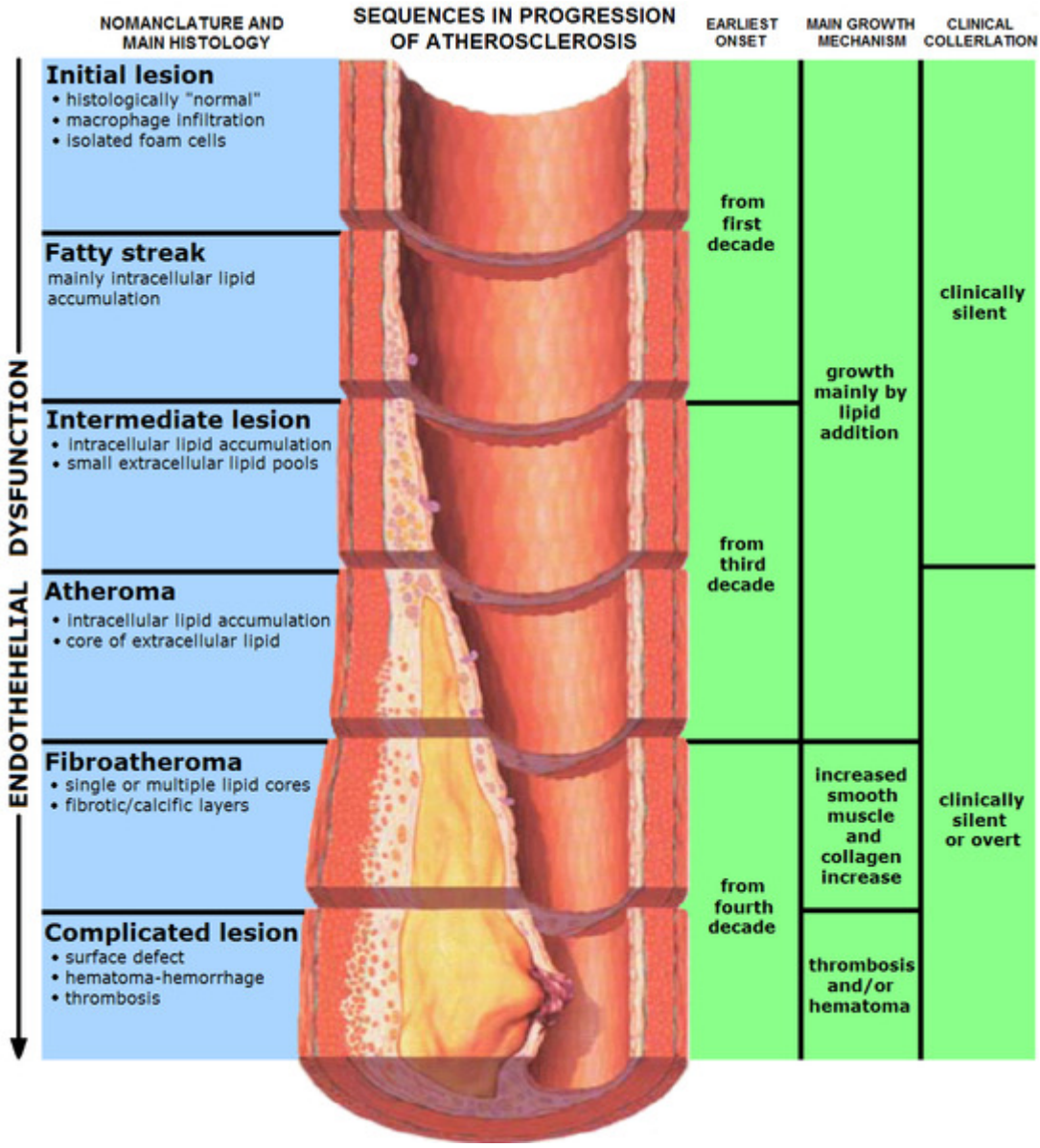
b. Appearance of pathological Q waves in ECG

c. ECG changes suggestive of ischemia (ST segment elevation / depression)

d. Coronary artery intervention (Eg. Coronary angioplasty)

2. Pathological findings of an acute Myocardial infarction

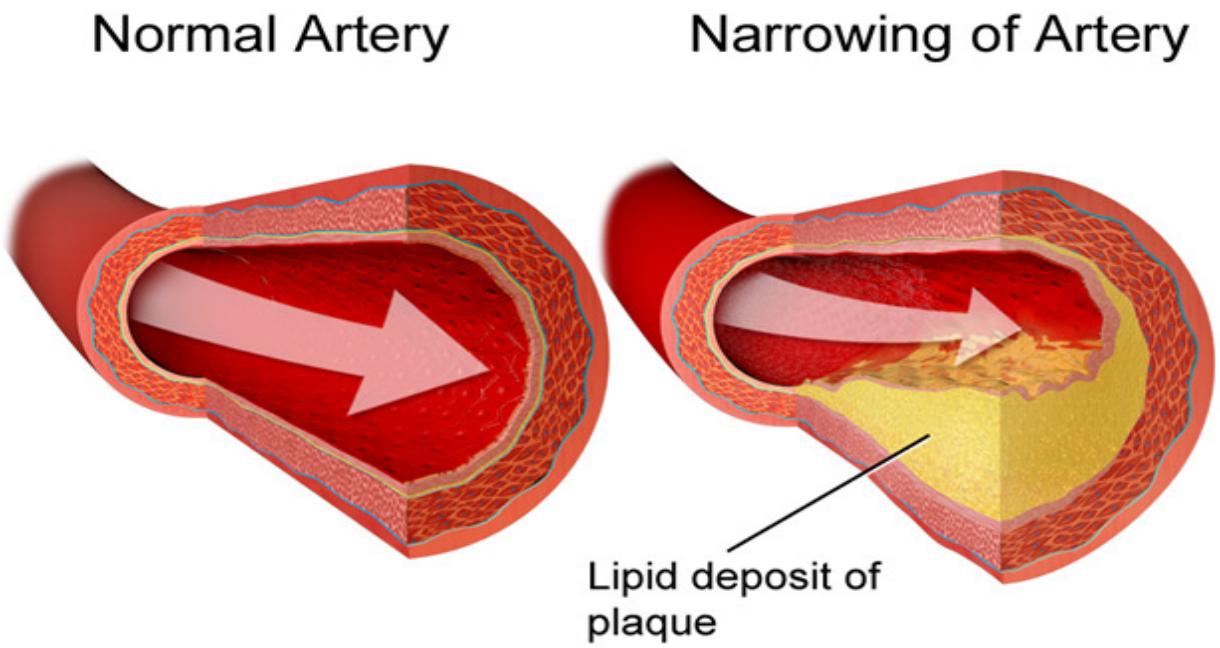
Atherosclerosis is a condition by which an artery wall thickens as a result of invasion and accumulation of white blood cells (WBCs) (foam cell) and proliferation of intimal smooth muscle cell creating a fibrofatty plaque.



The plaque deposits contain both living, active WBCs which causes inflammation, cholesterol and triglycerides. The remnants eventually include calcium and other crystallized materials within the outermost and oldest plaque. This plaque deposit reduce the elasticity of the artery walls. This process won't stop the blood flow for years, because blood vessels will adjust themselves at the area of plaque deposits.

The stiffening of wall may increase pulse pressure; widened pulse pressure is one possible result of advanced disease within the major arteries.

The plaque deposits on the artery walls is due to a chronic inflammatory response of WBCs. Low-density lipoproteins (LDL, plasma proteins that carry cholesterol and triglycerides) initiates this process, without adequate removal of fats and cholesterol from the macrophages by functional high-density lipoproteins (HDL). It is commonly referred to as a "hardening" or furring of the arteries. It is caused by the formation of multiple atheromatous plaques within the arteries.



Coronary Artery Disease

The plaque is isolated into three varied components:

- The atheroma, which is the nodular accumulation of a soft, flaky, yellowish material at the center of large plaques, composed of macrophages nearest the lumen of the artery.
- Bottom area of cholesterol crystals.
- Calcium (Ca) deposit at the outer area of the older or more advanced lesions (Tissue with some abnormalities).

Risk factors

American heart association (AHA) on the conference held in the year 1999, they classified the risk factors into 3 categories. Those are given below.

1. Traditional /Conventional risk factors.

- Smoking,
- Low in HDL cholesterol
- Elevated serum cholesterol
- Hypertension
- Diabetes mellitus

2. Predisposing factors

- ❖ Gender
- ❖ Physical inactivity
- ❖ Family history of CAHD
- ❖ Overweight & obesity
- ❖ Insulin resistance

3. Conditional factors

- ❖ Homocysteine
- ❖ Fibrinogen
- ❖ Small LDL particle
- ❖ C-reactive protein
- ❖ Lipoprotein (a)

Emerging risk factors

- ❖ Nitrotyrosine
- ❖ Oxidative stress
- ❖ Asymmetric dimethylarginine
- ❖ Myeloperoxidase

Smoking

Use of tobacco in the form of smoking is falls under the risk factor category that can be changeable/modifiable. This will also initiates other risk factors to come in lime light. Smoking will increases the risk of coronary atherosclerosis in men and women, irrespective of all ages. Smoking increases the risk of thrombosis (Blood clot formed inside a blood vessel, obstructing the flow of blood through the circulatory system), plaque rupture (Atheroma becomes vulnerable when the growth is rapid and it creates a thin cover that separates from the bloodstream inside the arterial lumen.), myocardial infarction (Heart Attack), Arrhythmias (heartbeat is irregular, too fast, or too slow.) And sudden death.

Smoking will initiates the oxygen (O_2) demand of myocardial tissue and hence making angina. Usage of tobacco in the form of smoking is responsible for 40% of Coronary artery disease (CAD). Even the passive smokers about 8% is also affected by Coronary artery disease (CAD).

Consumption of all tobacco products increases the risks for Coronary artery disease (CAD). Tobacco usage makes the blood vessels to lose the elasticity and make them hard. This results in blood clot or blocks the blood flow through coronary artery.

There is a misconception that occasional smokers are not at risk. If a person quits smoking, it will take three years for the body and heart to recover from the effects of tobacco. It has been found that 28% of all deaths from coronary heart disease are attributed to tobacco smoking. Compared with non-smokers, current smokers have a 70% increased risk of fatal coronary event and a two to four fold increased risk of non-fatal CAD.

Hyperlipidemia

Fats in the blood is termed as Lipid. Proper levels of lipid perform important functions in our body, but can cause health problems if they are present in excess. Hyperlipidemia (High lipid levels) means that high cholesterol and high triglyceride levels deposit. Hyperlipidemia causes the arteries to lose their elasticity.

Atherosclerosis increases your risk of heart disease, stroke, and other vascular diseases. Fortunately, you may be able to reduce high lipid levels and, therefore, prevent or slow the progression of atherosclerosis. Lifestyle changes like

exercising and eating a healthy diet can also lower your lipid levels and are often the first step in treatment.

Hypertension

In the modern word fast food is now inevitable and hence consumption of salt has been increased in the recent years. Stress also causes hypertension. Due to change of food habits we are consuming more trans-fat. People with high blood pressure are likely to develop Coronary artery disease (CAD) because high BP places an added force on the artery walls and over time, the extra pressure can damage the arteries. These injured arteries are most likely to become narrowed and hardened by fatty deposits.

Diabetes mellitus

Due to change of diet, young people are getting diabetes. The rise in diabetes is one among the risk factors for Coronary artery disease (CAD). Due to diabetes, a large portion of the heart will be damaged. Treatment for sudden cardiac diseases, also responds very poorly.

Diabetes will form the multiple blood clots often (Like Smoking), which will block the oxygen (O_2) and vital minerals supply to brain and heart.

The coronary artery disease (CAD) is responsible for 75% of all deaths in diabetic patients. There is endothelial and smooth muscle function impairment in diabetic patients. They also have increased adhesion of leukocytes to the vascular endothelial surface. This is very important step in atherosclerosis.

Patients with diabetes mellitus have two to eight fold higher rates of future cardiovascular events as compared with age and ethnically matched non-diabetic individuals.

Gender

Men have increased risk of atherosclerosis than pre menopause women. It is the most important predisposing factor for coronary atherogenesis. The female sex is having a protection from coronary artery disease by estrogen. Post menopause females are having equal risk of coronary artery disease (CAD) like men.

Obesity

In Modern India, people are having unity in diversity in Obesity. India is divided by not only by states and languages but also by over nourished and the malnourished.

Obesity is the key reason to develop diabetes, high BP, high cholesterol. In India people stores fats in the form ‘apple type,’ which is dangerous because of all metabolic byproducts of visceral fat cells easily enter the liver and get stored as fat.

Unhealthy food habits

Due to modernization, Indian vegetarian food is also equally dangerous to Non-Vegetarian food. Since Indians used to consume more refined carbohydrate, saturated fat, trans-fat and fried items in their diet. Today youngsters are highly attracted towards junk food, causing obesity in the early ages.

Physical inactivity

Technology makes a rocket science easier but physical activities harder to handle. Physical inactivity initiates the other risk factors for Coronary artery disease (CAD), such as hypertension, diabetes and obesity.

In the world youngster population around 80 % of people are physically inactive and remaining 20% concentrates only on muscle development rather than aerobics.

The American Heart Association has recommended an exercise energy expenditure approaching 2000 calories each week, a level of exercise that can be achieved with modest daily exertion.

Novel atherosclerotic risk factors

A bunch of new risk factors for atherothrombotic risk are identified. They are proved by epidemiological studies. They are useful clinically. They are fibrinogen, lipoprotein (a), plasminogen activation inhibitor-1, homocysteine and high sensitivity C reactive protein.

C reactive protein

C reactive protein is a pentraxin family member and plays an important role in the human innate response. This will also affects vascular vulnerability. If test value of CRP > 3 mg/L then there may be the chance for recurrent coronary events.

Lipoprotein (a)

Berg et al first described in detail, followed by Mclean et al who describes about it clinical importance. There are some structural similarities with apoprotien (a) and plasminogen.

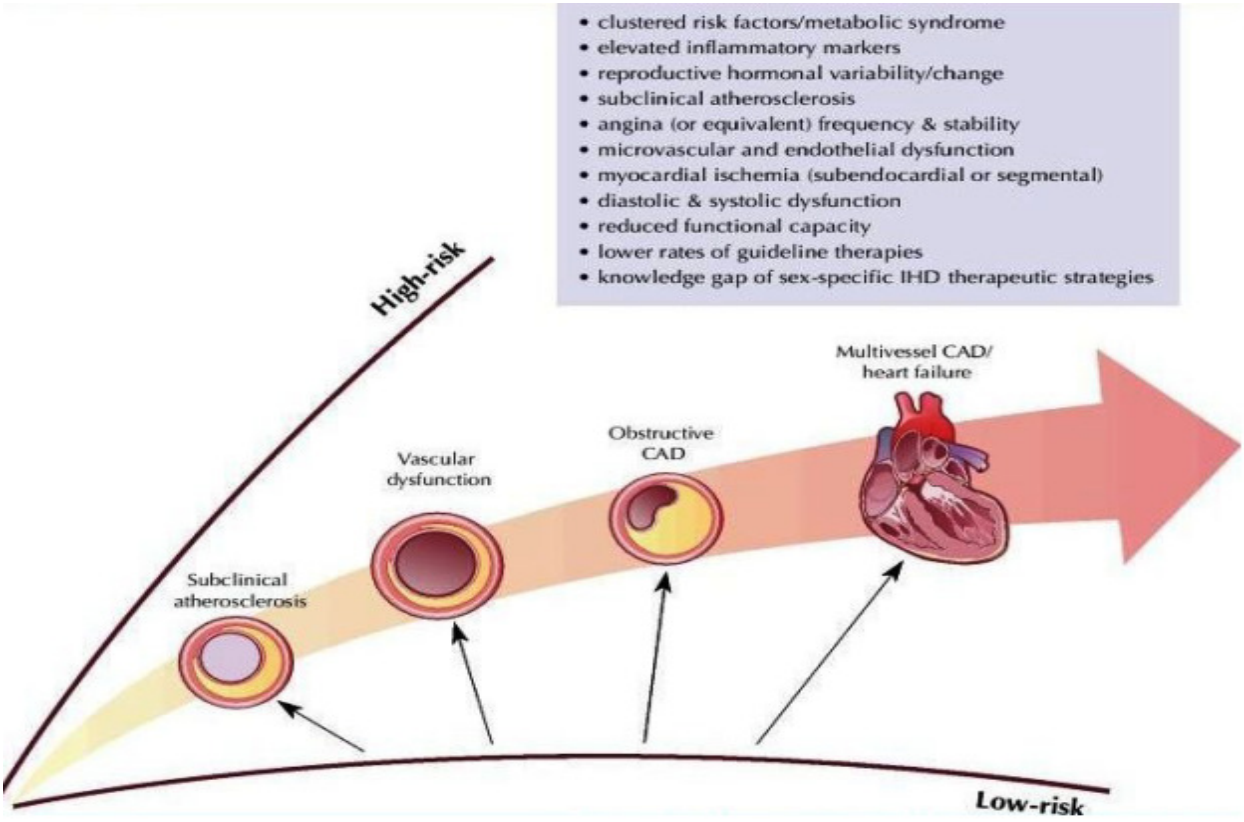
It has LDL particle with apo B-100. This component is linked by a disulphide bridge to apoprotien (a). One of the member of the family 'KRINGLE', Apoprotien (a) is containing proteins. Other members of this family include proteins such as Plasminogen, Prothrombin, Factor XII, urokinase type Plasminogen activator and Macrophage stimulating factor.

Lipoprotein (a) acts by binding on the endothelium. It competes with plasminogen. It binds to plasminogen receptor on endothelium. Thus it reduces the activity of plasminogen. Many epidemiological studies proves positive relation between lipoprotein (a) and atherogenic risk.

Their plasma concentration is inversely proportional to the size of apoprotein isoform. Thus small isoforms are associated with higher plasma Lp(a) concentration.

At birth Lp (a) levels are low and adult levels achieved in two years. Levels are high in asian and African population. Levels above 30 mg/dl are significant.

Serum Lp(a) levels elevated in type 2 DM, renal failure, menopause , hypothyroidism and malignancy. Height, weight, BMI, diet, weight loss and physical activity do not affect the level of serum lipoprotein (a).



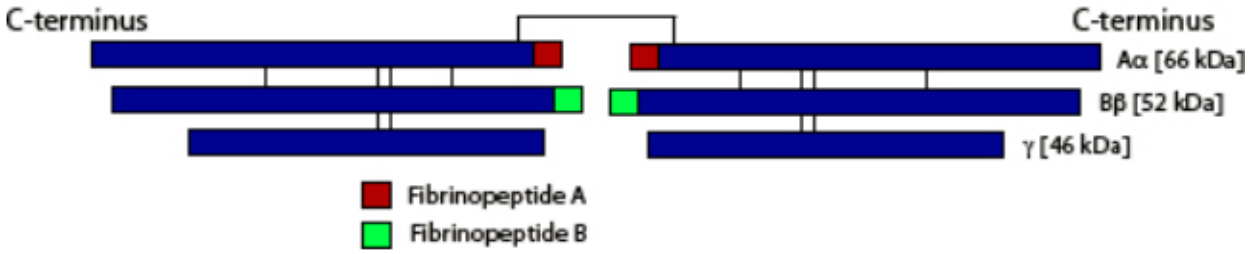
FIBRINOGEN

Fibrinogen, is one among 13 coagulation factors that is responsible for normal blood clot. Fibrinogen is called as Factor 1(I), which is a blood plasma protein. Many studies about fibrinogen confirms that plasma fibrinogen is key risk factor for cardiovascular disease (CVD). When the blood starts bleeding then our body initiates coagulation cascade, which is the process by which blood separates the plasma to form a thick mesh and to stop bleeding. If plasma fibrinogen is insufficient or the cascade is not working, that results in excessive bleeding, will cause fatal results.

When the level of plasma fibrinogen is low than the required value 150-400 mg/dl then there will be the possibilities of thrombosis. **Thrombosis** is the process of forming a clot inside blood vessel. The clot bocks the normal flow of blood through the circulatory system. This can lead to serious medical conditions such as heart attack and stroke.

FIBRINOGEN STRUCTURE:

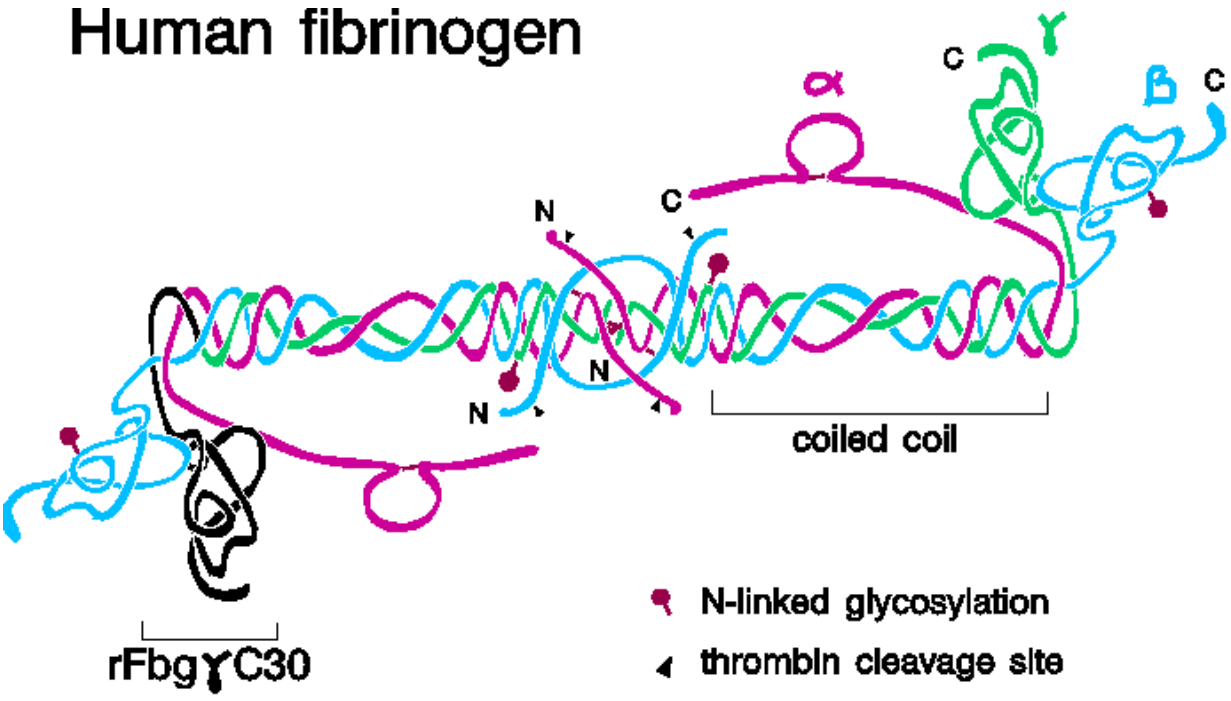
Plasma fibrinogen is synthesized in the liver by the hepatocytes. It is released into circulation with half-life of nearly 100 hrs. It is degraded at rate of 24 % per day. The turnover rate of fibrinogen is about 1.7 to 5.0 gm/day.



The fibrinogen, a precursor of fibrin with molecular weight of 340 kDa, with length 45 nm, diameter 9nm, is a glycoprotein molecule. Normal plasma level is 200 to 400n mg / dL. It consists of three pairs of polypeptide chains (3X2). They are namely Aalpha(Aα), Bbeta & gamma chains. They are held together by 29 disulphide bonds. There are 2 Aalpha, 2 Bbeta and 2 Gama chains.

The central nodule or E-domain is 5 nm in diameter and contains the NH2-terminal of all six polypeptide chains forming the NH2-terminal disulfide knot. The two outer D-domain nodules are composed of the C-terminal two thirds of both the Bβ

and γ chains. Between the E- and D-domains, there is a stretch of approximately 120 amino acids from each of the three chains that forms an α-helical structure known as the coiled-coil domain. This region of the molecule is supported on both sides by a set of disulfide bonds called disulfide rings. These rings play an important role in making fibrin mechanically strong and resistant to proteolysis. Structural elements in each of the individual chains are needed for blood coagulation.



Fibrinogen alpha chain

Gene-Phenotype Relationships in alpha chain

Location	Phenotype	Phenotype MIM number	Inheritance (in progress)	Phenotype mapping key
4q31.3	Afibrinogenemia, congenital	202400	AR	3
	Amyloidosis, familial visceral	105200	AD	3
	Dysfibrinogenemia, congenital	616004		3
	Hypodysfibrinogenemia, congenital	616004		3

The alpha component of fibrinogen composed of 3 pairs of non-identical chains made of polypeptide. During vascular damage, fibrin will be formed from fibrinogen by thrombin, which is the most ample component of blood clots. Cell adhesion and spreading is controlled by numerous products of fibrinogen and fibrin. Display vasoconstrictor and chemotactic activities, and are mitogens for several cell types. Many disorders like dysfibrinogenemia, hypofibrinogenemia, afibrinogenemia, and renal amyloidosis are created by mutating the alpha gene. Alternative splicing results in two isoforms that vary in the carboxy-terminus. The 3 pairs of plasma fibrinogen are located on chromosome 4.

The identifiers for fibrinogen alpha chain is as below.

Identifiers	
Symbols	FGA ; Fib2
External IDs	OMIM: 134820 MGI: 1316726 HomoloGene: 428 ChEMBL: 1831 GeneCards: FGA Gene

After nerve crush, fibrin is deposited and the cleaning is interconnected with repair of nerve after injury of nerve. A thorough study shows that quantitative myelinating axons are more in fibrinogen-deficient than the normal one. Fibrin induced ERK1 (MAPK3; 601795)/ERK2 (MAPK1; 176948) and production of p75 nerve growth factor low-affinity receptor (NGFR; 162010) in Schwann cells; Both ERK1 and NGFR are maintained in a nonmyelinating state by fibrin, suppressed fibronectin production, and prevented synthesis of myelin proteins.

There is a conjectured study that says, regulation of fibrin clearance and/or deposition is a regulatory mechanism for Schwann cell differentiation after nerve damage. Apart from Cardiovascular disease (CVD), fibrinogen is also a cerebrovascular risk factor in Alzheimer disease that will alter fibrin clot structure and causing delay in clot degradation. RU-505 act as an inhibitor of the interaction

between beta-amyloid and fibrinogen. The interaction between beta-amyloid and fibrinogen may be useful in AD therapy.

Fibrinogen beta chain

Gene-Phenotype Relationships in beta chain

Location	Phenotype	Phenotype MIM number	Inheritance (in progress)	Phenotype mapping key
4q31.3	Afibrinogenemia, congenital	202400	AR	3
	Dysfibrinogenemia, congenital	616004		3
	Hypofibrinogenemia, congenital	202400	AR	3

To bind vascular endothelial cadherin both FGB (15-42) peptide fragment and fibrin fragment N-terminal disulfide knot-II are used. So this bind will stop transmigration of leukocytes across endothelial cell monolayers. Interplay of fibrin fragments, leukocytes, and CDH5 contributes to the pathogenesis of myocardial damage and reperfusion injury.

The identifiers for fibrinogen beta chain is as below.

Identifiers	
Symbols	FGB ; HEL-S-78p
External IDs	OMIM: 134830 MGI: 99501 HomoloGene: 3772 ChEMBL: 2048 GeneCards: FGB Gene

A detailed study says that fibrinogen genes RFLPs is having a strong association between polymorphism detected with a beta-fibrinogen probe and the enzyme BclI. About 15% of variance was recorded for fibrinogen locus out of total variance in fibrinogen level.

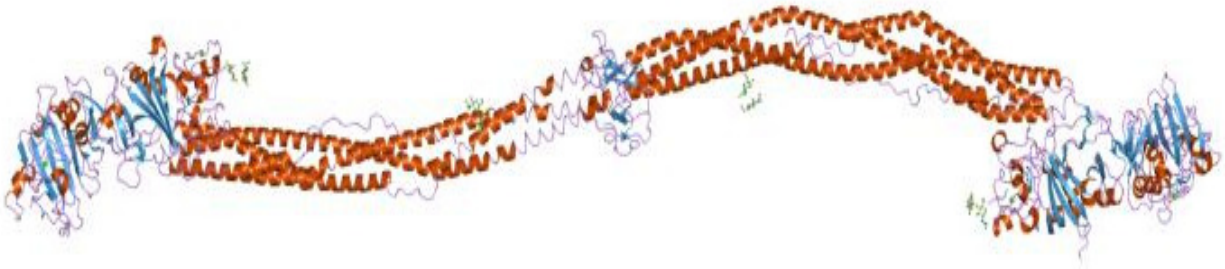
In a large study, found that the -455G-A polymorphism in the FGB promoter is associated with an increase in plasma fibrinogen in both genders, but does not appear to cause ischemic heart disease.

There is a relationship between FGB locus which is present in homozygous or heterozygous state of an allele. Mutation in the FGB gene will cause dysbetafibrinogenemia with thrombosis, and congenital afibrinogenemia.

Truncation of the 7 most C-terminal residues (arg455 to g1n461) of the B-beta chain specifically inhibited fibrinogen secretion. Expression of additional mutants and structural modeling suggested that neither the last 6 residues nor arg455 is crucial per se for secretion, but prevents protein misfoldine by protecting hydrophobic residues in the B-beta C-terminal core. Immunofluorescence and immunoelectron microscopy studies indicated that secretion-impaired mutants were retained in a pre-Golgi compartment. In addition, expression of FGB, FGG, and angiopoietin-2 (ANGPT2; 601922) chimeric molecules demonstrated that the B-beta C-terminal domain prevented the secretion of single chains and complexes, whereas the gamma C-terminal domain allowed their secretion.

In a study of 23,634 European Americans and 6,657 African American participants they identified a rare pro265-to-leu variant in FGB (rs6054) associated with lower fibrinogen.

Fibrinogen alpha/beta chain family



Fibrinogen gamma chain

Gene-Phenotype Relationships in beta chain

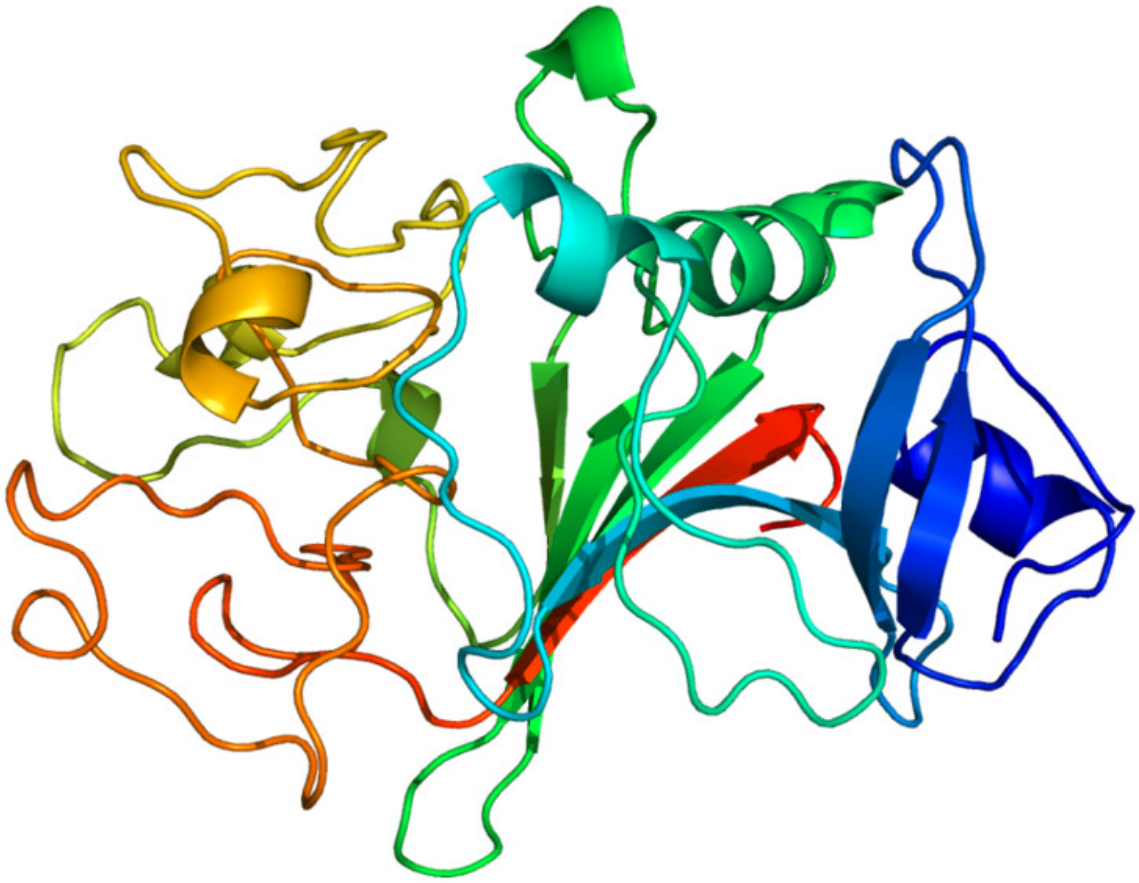
Location	Phenotype	Phenotype MIM number	Inheritance (in progress)	Phenotype mapping key
4q31.3	Afibrinogenemia, congenital	202400	AR	3
	Dysfibrinogenemia, congenital	616004		3
	Hypodysfibrinogenemia	616004		3
	Hypofibrinogenemia, congenital	202400	AR	3

In the study of single fibrin fibers using an atomic force-fluorescence microscopy technique. They determined the extensibility and elastic limit of fibers formed in the presence and absence of factor XIIIa. Factor XIIla induces covalent crosslinks between gamma chains (along the fiber axis) and between the alpha chains. Samples without factor XIIIa showed no crosslinking. Uncrosslinked fibers extended 226 +/- 52%, and crosslinked fibers extended 332 +/- 71%, or 4.32 times their original length. The most extreme fibers could be extended over 6 times their length. These extensibilities are the largest of any protein fiber. These data suggested that clot rupture does not arise from the rupture of individual fibers, as had been assumed; rather, the branch points of the network forming the clot yield first.

The identifiers for fibrinogen gama chain is as below.

Identifiers	
Symbol	FGG
External IDs	OMIM: 134850 MGI: 95526 HomoloGene: 429 ChEMBL: 4058 GeneCards: FGG Gene

Fibrinogen gamma chain

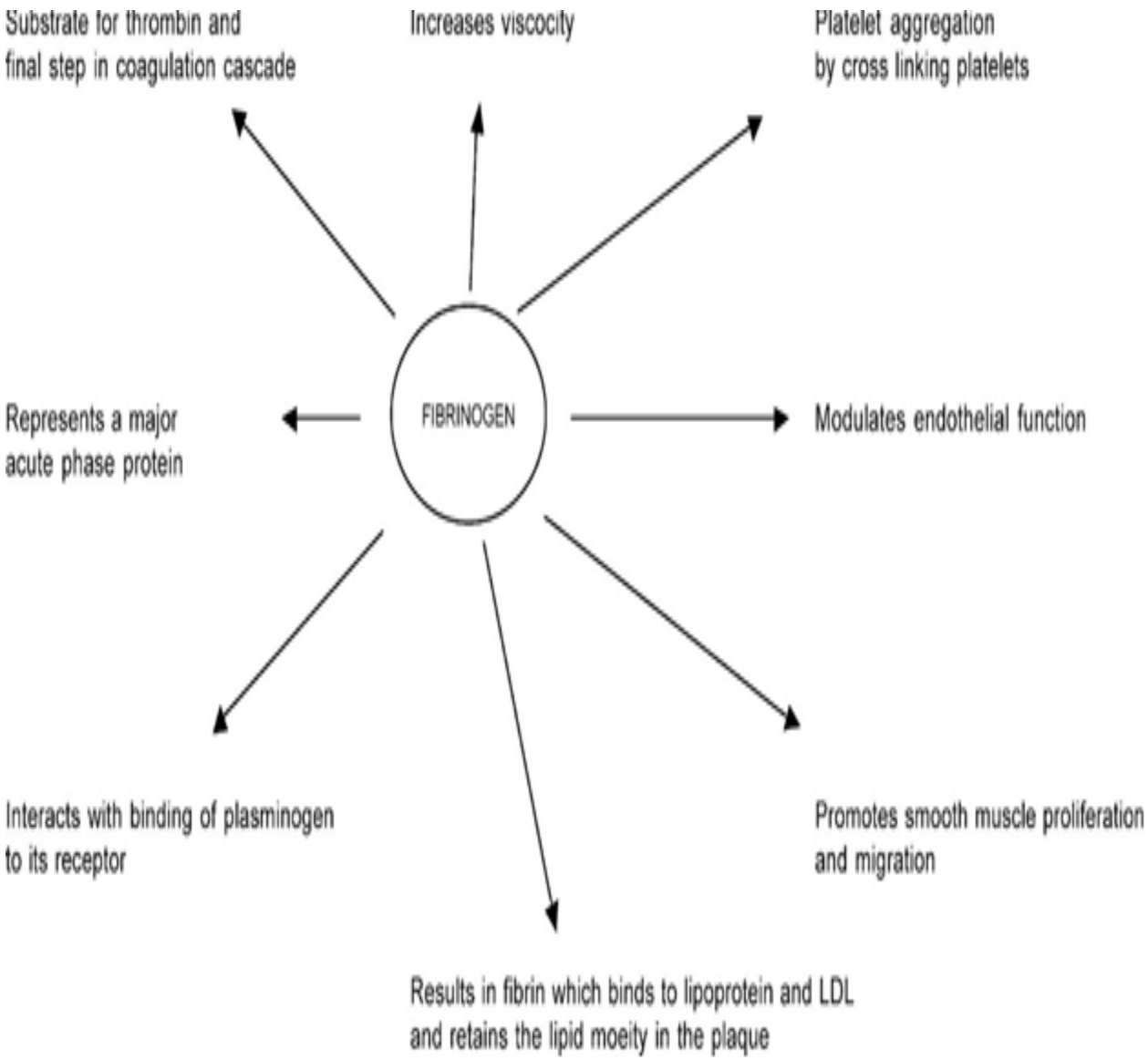


Function

It is the clotting factor I, according to the system for naming blood clotting factors. It plays vital role in coagulation pathway. It produces fibrin on activation.

Results in fibrin which binds to lipoprotein and LDL and retains lipid moiety in the plaque. It is also important mediator in inflammation and atherogenesis. It plays

pivotal role in throinbogenesis. The possible mechanisms include increased blood viscosity and enhanced platelet aggregation. It also causes atherothrombosis by infiltrating the vessel wall. Thus they favour thrombus formation.



Role in Inflammation

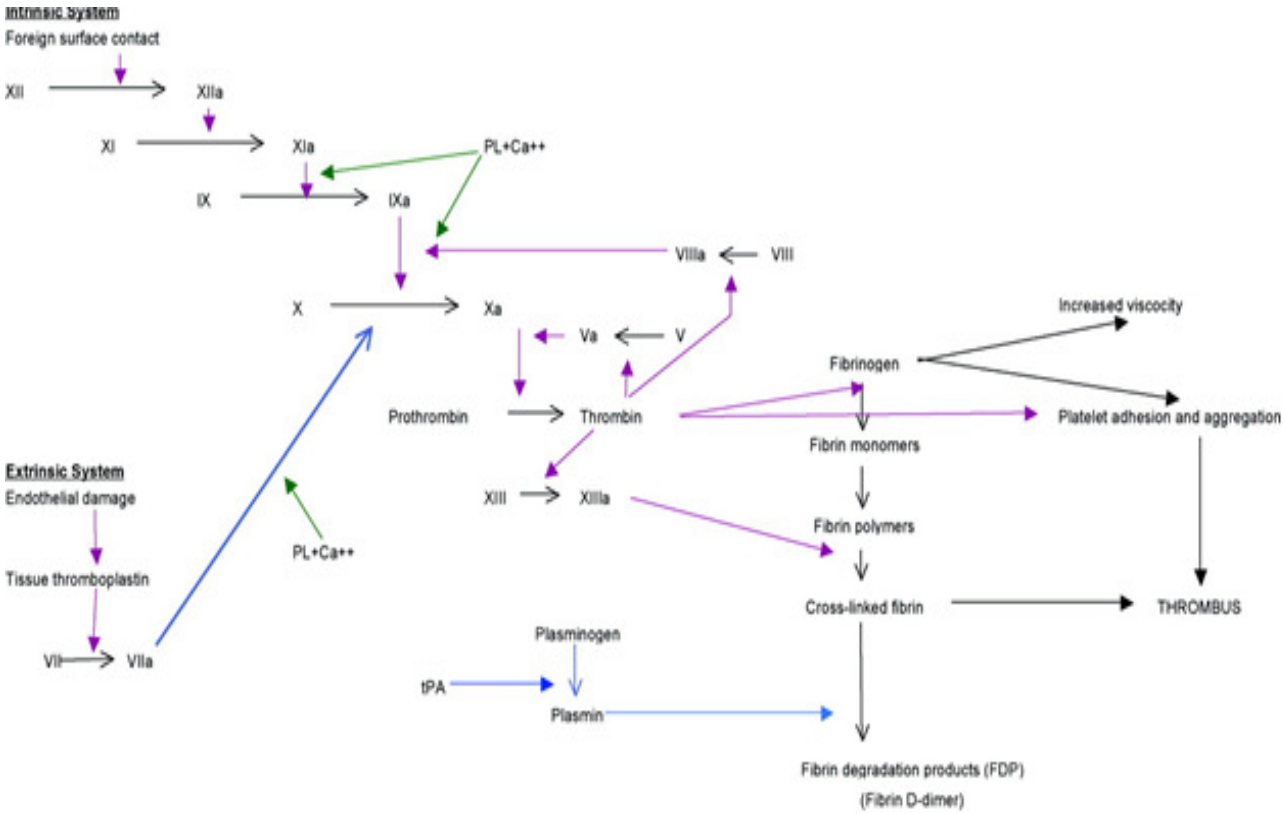
They interact with WBCs by `integrins'.The integrins are surface receptors coated on the leukocytes.Macl and alpha X and beta 2 are the fibrinogen binding receptors.Mac 1 is very specific for fibrinogen. Fibrinogen also bind with intercellular adhesion molecule-1 (ICAM-1L ICAM-1 is otherwise called CD54.It is present over vascular endothelium.

Fibrinogen attaches with Macl and also interacts with ICAM-1 to cause adhesion of monocytes over vascular endothelium. Fibrinogen also upregulates the expression of ICAM-1 or CD54 over the vascular endothelium.

Fibrinogen favours chemotaxis. Thus it is important in inflammation. This effect is mediated by binding with integrins receptors of leukocytes. As a consequence of this activation.the neutrophil activation markers are expressed. There is also increase in calcium concentration intracellularly. Fibrinogen favors cell to cell adhesion and also facilitate cell to collagen (extracellular matrix). Thus it facilitates the inflammatory response.

Role in Thrombogenesis

Thrombogenesis is regulated by a fine balance between the coagulation and fibrinolytic pathways Subsequent to vessel wall trauma, tissue thromboplastin is released from the sub-endothelium. Tissue thromboplastin in turn triggers the extrinsic pathway of coagulation by activating factor VII to Vida. Contact of blood with the foreign surface initiates the intrinsic pathway of coagulation, by activating factor XII to XIIa, as well as platelets. Platelet aggregation, however, does not confer adequate stability, and therefore activation of the coagulation pathway is also necessary.



Role in Atherogenesis

Fibrinogen plays pivotal role in causing endothelial damage. The fibrin formed upon activation of fibrinogen, initially acts over the intimal layer of the vessel wall and it promotes cellular proliferation. They favour cell migration and cell adhesion. The fibrin degradation products are the main stimuli for chemotaxis, extracellular matrix synthesis and their proliferation. This affects the vascular permeability and their tone. There is clear evidence for large amount of fibrin deposition in the atherosclerotic lesions in the human blood vessels. They are present either over the intact surface of plaque or buried within the fibrous cap.

Determinants of fibrinogen

Genetics:

There is 30 to 50 % variation in the genetic polymorphism

Gender:

The post-menopausal women generally have their fibrinogen levels elevated when compared with age matched men. This is irrespective of pregnancy. It is also independent of use of oral contraceptive pills.

Smoking:

Smoking increases the risk of elevation of fibrinogen. There is proportional increase of 350mg/dl with each cigarette smoked. Smoking causes inflammation of pulmonary alveoli and bronchus. This in turn increases concentration of IL-6 which promotes synthesis of acute phase reactants from liver.

Alcohol:

Moderate alcohol consumption reduces plasma fibrinogen levels. According to DESIR study, those who do not take alcohol or heavy drinkers taking more than 70gms/day have more plasma fibrinogen values.

Obesity:

BMI, Waist Hip Ratio (WHP), and Waist circumference in both male and female is having a positive relationship with obesity, increasing the risk of elevated plasma fibrinogen levels.

Exercise:

Regular physical inactivity increases the level of fibrinogen. The people having more physical activities, having low fibrinogen levels. This effect attributes to the cardiovascular benefits of regular physical exercise.

Hormonal Influence:

The use of oral contraceptive pills is associated with elevated fibrinogen levels

Age:

Age contributes to increased fibrinogen levels. This is attributed to the delayed clearance from plasma.

Role of Vitamins:

Dietary intake of Vitamin C reduces plasma fibrinogen to a great extent.

Role of Infections:

Certain organisms like Helicobacter pylori and Chlamydia were implicated in causing coronary artery disease. The role of fibrinogen may be explained following these infections. Its level is also increased in periodontal infections.

Fibrinogen Assays

Assays	
Clauss	A functional assay based upon the time for fibrin clot formation
PT-derived Fibrinogen Assays	A derived fibrinogen based upon the prothrombin time
Immunological	An immunological method which measures fibrinogen antigen rather than functional fibrinogen
Gravimetric	A method based upon clot weight

Methods:

Assay	
Clauss Assay	Diluted plasma is clotted with a high concentration of thrombin. The plasma is diluted (usually 1:10 but this may vary if the fibrinogen concentration is very low or very high) to minimise the effect of 'inhibitory substances' within the plasma e.g. heparin, elevated levels of FDPs. The use of a high concentration of thrombin (typically 100 U/ml) ensures that the clotting times are independent of thrombin concentration over a wide range of fibrinogen levels. The test requires a reference plasma with a known level of

	fibrinogen calibrated against a known international standard. A calibration curve is constructed using this reference plasma by preparing a series of dilutions (1:5 –1:40) in buffer to give a range of fibrinogen concentrations. The clotting time of each of these dilutions is established (using duplicate samples) and the results (clotting time(s)/fibrinogen concentration (g/L) are plotted on log-log graph paper. The 1:10 concentration is considered to be 100% i.e. normal. There should be a linear correlation between clotting times in the region of 10-50s. The test platelet poor diluted plasma (diluted 1:10 in buffer) is incubated at 37°C, phospholipid and thrombin are added followed by calcium (all pre-warmed to 37°C). On the addition of the calcium timing begins. The time taken for the clot to form is compared to a calibration curve and the fibrinogen concentration deduced. Most laboratories use an automated method in which clot formation is deemed to have occurred when the optical density of the mixture has exceeded a certain threshold.
PT-derived Fibrinogen Assays	The PT is determined by optical density change for a range of plasma dilutions with known fibrinogen levels. The optical change for each different fibrinogen level is plotted as a calibration curve. A PT is performed on the patient's platelet poor plasma and the fibrinogen derived from the change in optical density compared to the calibration curve. The derived fibrinogen is a simple and inexpensive test and is widely used. However, the test can give misleading results in some disorders and is not recommended for routine laboratory use.
Immunological Assays	Assays based on enzyme linked immunoabsorbant assays (ELISA), radial immunodiffusion and electrophoresis are the most commonly employed. Immunological assays measure protein concentration rather than functional activity.

	They are of value in the investigation of congenital dysfibrinogenaemias where there is a discrepancy between functional activity and antigen level.
Gravimetric Assays	**1. Clot Weight** Similar to the Clauss method - a fibrinogen clot is formed by the addition of thrombin and calcium to dilute patient plasma. However, instead of using the time to clot formation to derive the fibrinogen the clot is compressed (to extrude plasma and unused reagents), washed, dried then weighed. This assay is technically difficult and time consuming. **2. Clottable protein** Thrombin is added to plasma without calcium and the clot formed is washed then dissolved in an alkaline reagent then spectrophotometry is performed (e.g. typically absorbance at 282nm). The clot is almost all fibrin and so the measured protein concentration is taken as equivalent to the fibrinogen concentration.
TEG	The thromboelastogram has been used to measure functional fibrinogen levels

Fibrinogen assay for different clinical circumstances

Assays	
Investigation of bleeding	Clauss
Suspected dysfibrinogenaemia	Clauss *and* clottable protein *and* immunoassay
Bleeding disorders affecting factors in addition to fibrinogen (e.g. DIC)	Clauss
Thrombolytic therapy	Clauss
Very high fibrinogen levels	Clauss or immunoassay

MATERIALS AND METHODS

MATERIALS AND METHODS

SOURCE OF DATA

- Cases for the present study were selected randomly from the inpatients of ICCU ward, and male and female medical wards admitted with acute myocardial infarction, in Tirunelveli medical college hospital, Tirunelveli.

PERIOD OF STUDY

- August 2014 to August 2015

STUDY DESIGN

- Prospective cross sectional study.

SAMPLE SIZE

- 70 patients, 35 Males and 35 Females

METHODOLOGY

All patients admitted to the Intensive Coronary Care Unit, male and female medical wards in whom a diagnosis of acute Myocardial Infarction was made

based on clinical features, ECG changes and elevated cardiac biomarkers, were considered for the study.

Inclusion Criteria

All patients of both the sexes admitted in ICCU and medicine wards are included in the study if

- ❖ Patients fulfilling WHO criteria for acute myocardial infarction
- ❖ At least two of the three elements presenting within 48 hours
  - History of ischemic chest discomfort
  - Typical ECG changes
  - Elevated cardiac enzymes

Exclusion Criteria

- Smokers
- Patients with diabetes mellitus
- Patients with CVA/ history of CVA
- Patients with Peripheral vascular disease
- Women on HRT
- Women on OCP
- Patients with evidence of infection/inflammation

- Patients on Fibrates, CCB, beta blockers
- Patients with liver disease, renal disease, respiratory failure
- Congenital Heart disease
- Rheumatic Heart disease
- Structural Heart disease
- Electrical abnormalities

Persons included in the study were informed about the aim of the study and consent (**Annexure II**) was obtained. The necessary clearances from the concerned departments and the ethical committee was obtained prior to the start of the study.

A detailed clinical history was taken and a thorough clinical examination and the required laboratory investigations were done. The details collected from each patient was entered in the Proforma. (**Annexure I**).

The details of the patients regarding age, sex, presenting symptoms, risk factors like smoking, alcohol intake, food habits, diabetes, hypertension, drug intake and menstrual status were recorded. The vital signs like Pulse and Blood pressure were recorded and Body mass index was calculated.

Patients were classified accordingly as overweight and obese based on body mass index.

BMI = Weight (kg)/height (mt2)

Obesity - BMI > 30

Over weight - BMI 25 to 30

All the patients were subjected to routine laboratory investigations like complete blood count, renal function tests, liver function test, random blood sugar and lipid profile.

According to NCEP-ATP III guidelines, patients were considered to have dyslipidemia when

- Total cholesterol > 200 mg%,
- HDL < 40 mg%
- LDL > 100 mg%
- Triglycerides > 150 mg%

Serum Creatinine Phosphokinase MB (CPK-MB) were also measured. ECG was taken in all patients, Troponin-T levels was done in NSTEMI and unstable angina patients.

Plasma fibrinogen level

The Plasma fibrinogen levels were measured quantitatively by Coagulation method done by SYSMEX 500 series. Plasma fibrinogen values greater than 400 mg/dl is considered as hyperfibrinogenemia. All the patients were followed up during their hospital stay and the outcome recorded.

The information collected regarding all the selected cases were recorded in a Master Chart (**Annexure III)**. Data analysis was done with the help of computer using a software called Epidemiological Information Package (EPI 2010) developed by Centre for Disease Control, Atlanta, USA.

Using this software, all the range, frequencies, percentage, mean, standard deviation, chi square and p value can be calculated. The tests used are One way ANOVA test and Student's 't' test for data and Kruskul Wallis Chi-square test for consolidated tables.

OBSERVATIONS AND RESULTS

OBSERVATIONS AND RESULTS

70 patients (including 35 Males and 35 Females) with clinical features and ECG features suggestive of myocardial infarction were enrolled in our study. Plasma Fibrinogen levels were measured in addition to other routine investigations and the results compared.

AGE DISTRIBUTION

In this study the average age of males were 56.05 and average age of females were 64.17

Table 1: Age wise distribution of cases in Males

SL.NO	AGE IN YEARS	NO.OF CASES (n=35)	PERCENTAGE %
1.	35-45	4	11.43
2.	45-55	15	42.86
3.	55-65	9	25.71
4.	65-75	7	20

Table 1 show male patients were between the age group of 35 to 75 years. There were 4 patients (11%) below 45yrs of age. Youngest male patient in this study was 36 years old.

Chart 1: Age wise distribution of cases in Males

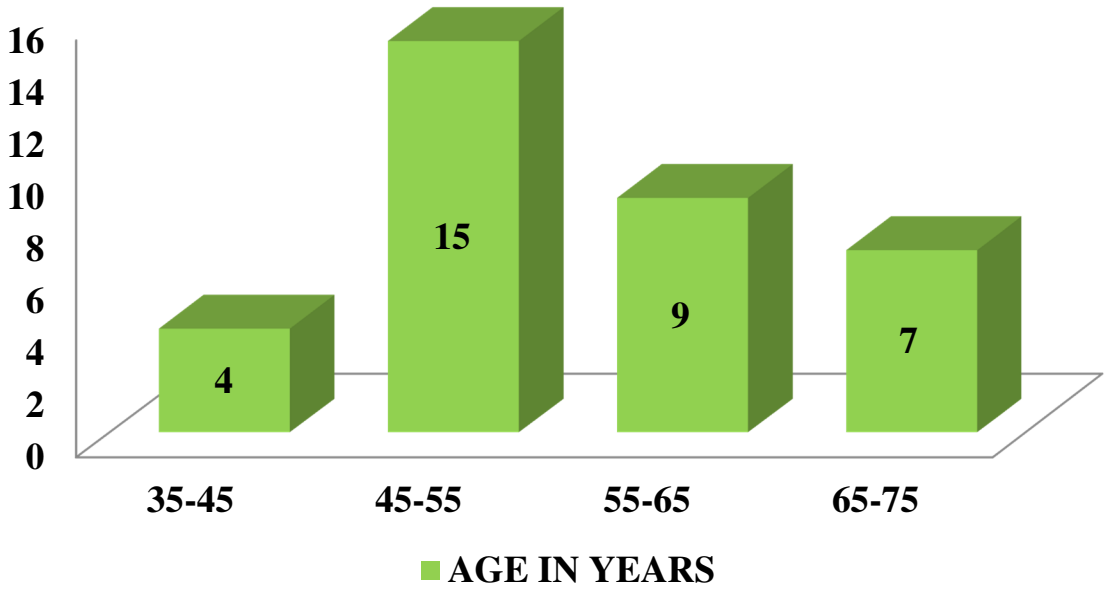


Chart 1 shows the age wise distribution of cases in males. In our study, MI was common in the age group of 45-55yrs among male patients.

Table 2: Age wise distribution of cases in Females

SL.NO	AGE IN YEARS	NO.OF CASES (n=35)	PERCENTAGE %
1.	35-45	0	0
2.	45-55	3	8.57
3.	55-65	14	40
4.	65-75	18	51.43

In this study the female patients were between the age group of 45 to 75 years. There were 3 (8.5%) patients in 45-55 years group. Youngest female patient in this study was 40 years old.

Chart 2: Age wise distribution of cases in Females

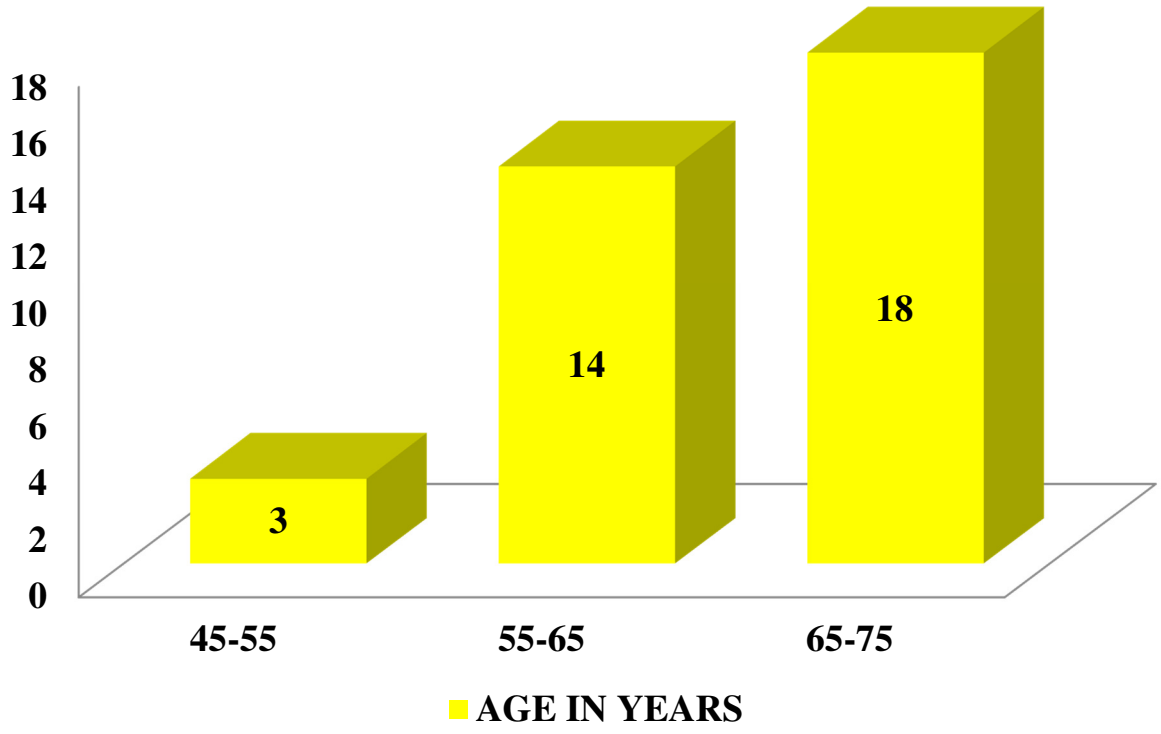


Chart 2 shows the age wise distribution of cases in females. According to our study 18 cases (51% of patients) were in the age group 65-75.

Chart 3: Comparison of Age wise distribution of cases in Males and Females

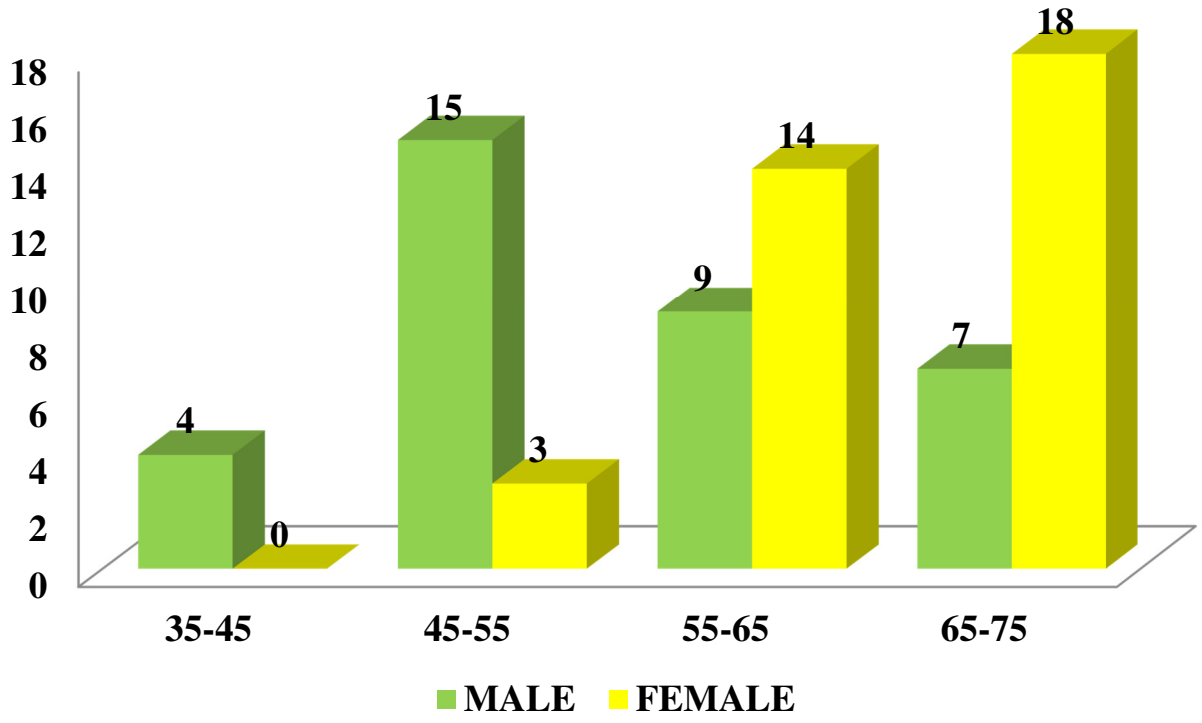


Chart 3 shows the comparison of age in male and female cases with MI. Among male patients, the incidence of MI is more in age group 45-55yrs (42.86%) whereas in females, it is in 65-75 age group (51%).

SYMPTOMATOLOGY

Typical symptoms of MI include substernal chest pain or pressure radiating to the arms and back associated with sweating, nausea, light headedness, palpitations.

Other symptoms such as dyspnea, fatigue and lack of energy are considered as atypical symptoms and are found to be predominant in female patients in our study.

Table 3: Symptoms at the time of admission in Male patients

SL.NO	SYMPTOMS	NO.OF CASES (n=35)	PERCENTAGE %
1.	TYPICAL	26	74.29
2.	ATYPICAL	9	25.7

In the total of 35 male cases 74.29% (26 cases) had typical symptoms and 25.71% (9 cases) had atypical symptoms on presentation.

Chart 4: Symptoms at the time of admission in Male patients

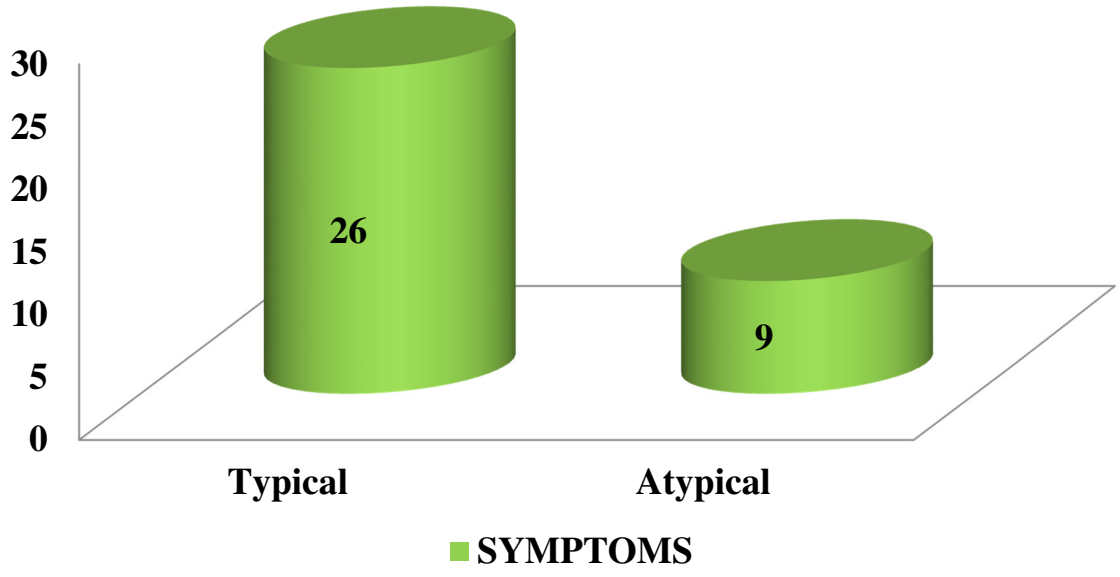


Chart 4 shows the number of cases having typical and atypical symptoms in male patients. According to our study male patients (74%) predominantly presented with typical symptoms.

Table 4: Symptoms at the time of admission in Female patients

SL.NO	SYMPTOMS	NO.OF CASES (n=35)	PERCENTAGE %
1.	TYPICAL	12	34.29
2.	ATYPICAL	23	65.71

Out of 35 female patients, 23 patients (65.71%) presented with atypical symptoms and only 12 cases (34.29%) had typical symptoms on presentation.

Chart 5: Symptoms at the time of admission in Female patients

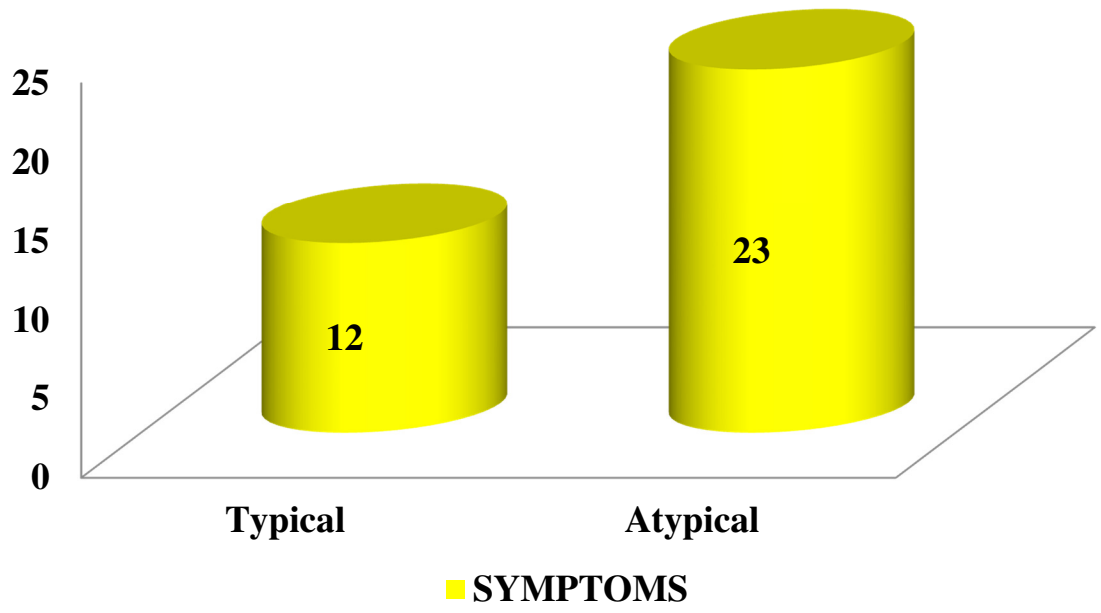


Chart 5 shows that 23 (65.71%) cases out of 35 cases had atypical symptoms and 12 cases out of 35 (34.29%) cases presented with typical symptoms.

Chart 6: Comparison of Symptoms in Male and Female patients

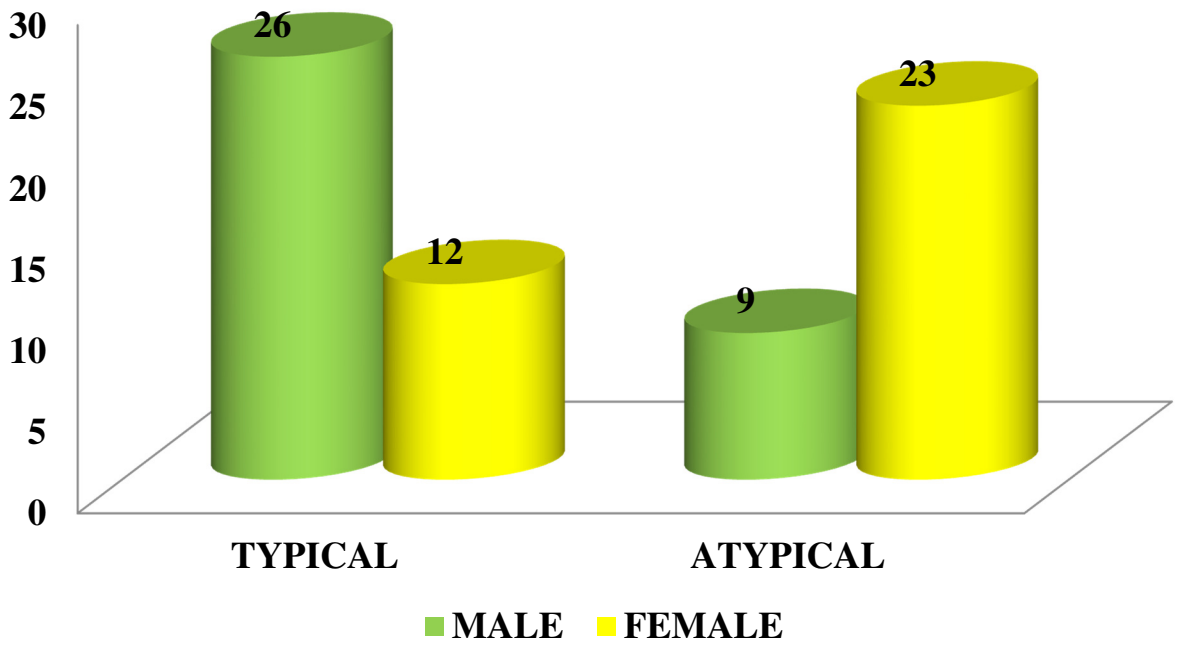


Chart 6 shows the comparative result of symptomatology at the time of admission in male and female patients. According to our study, typical symptoms are predominant in males while atypical symptoms are major presenting complaints in females.

Table 5: Menstrual status in Female patients

SL.NO	MENSTRUAL STATUS	NO.OF CASES (n=35)	PERCENTAGE %
1.	MENSTRUATING	3	8.57
2.	MENOPAUSAL	32	91.43

In this study, out of 35 females, 32 patients (91.43%) were in post-menopausal status.

Chart 7: Menstrual status in Female patients

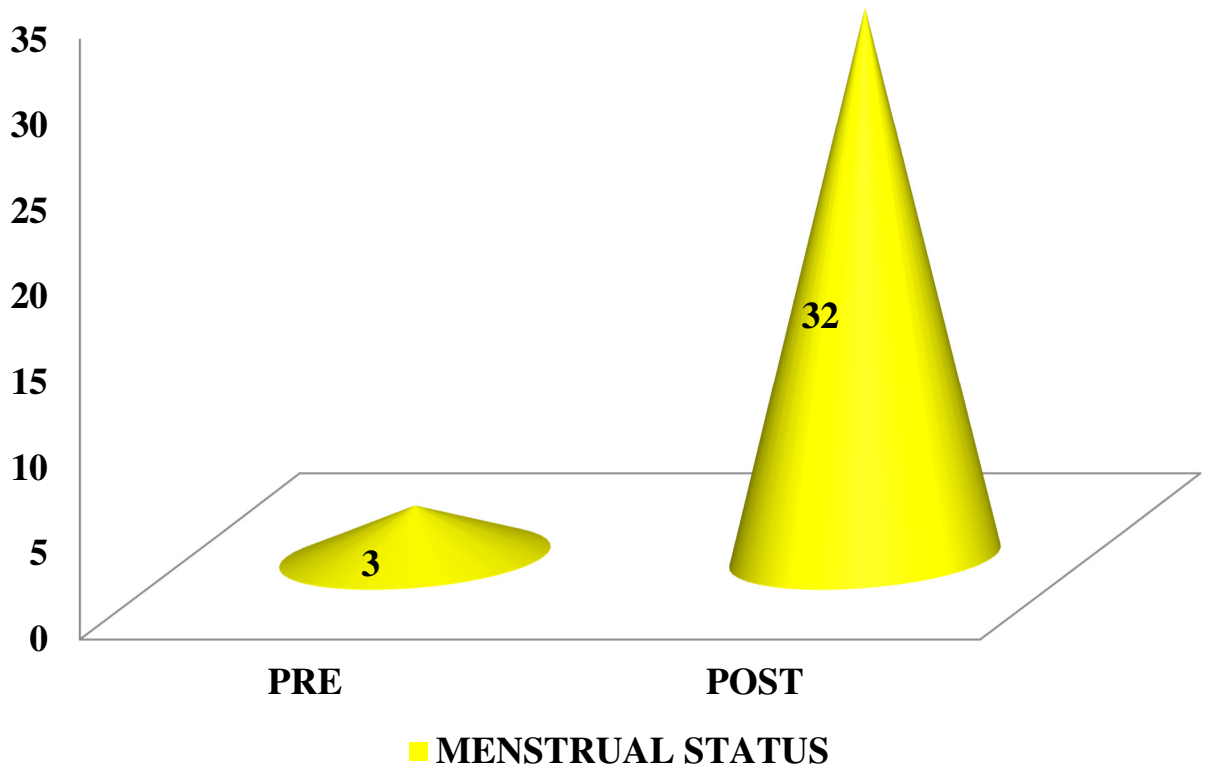


Chart 7 depicts the menstrual status of female patients with CAD. According to our study 91% of patients were in post-menopausal status.

BMI

Table 6: BMI Distribution in Male patients

SL.NO	BMI	NO.OF CASES (n=35)	PERCENTAGE %
1.	NORMAL	21	60
2.	OVER WEIGHT	12	34.29
3.	OBESE	2	5.71

In the BMI evaluation of male patients, 60 % were found to be normal, 34.20 % cases were in over weight category and 5.71 % were in obese category.

Chart 8: BMI distribution in Male patients

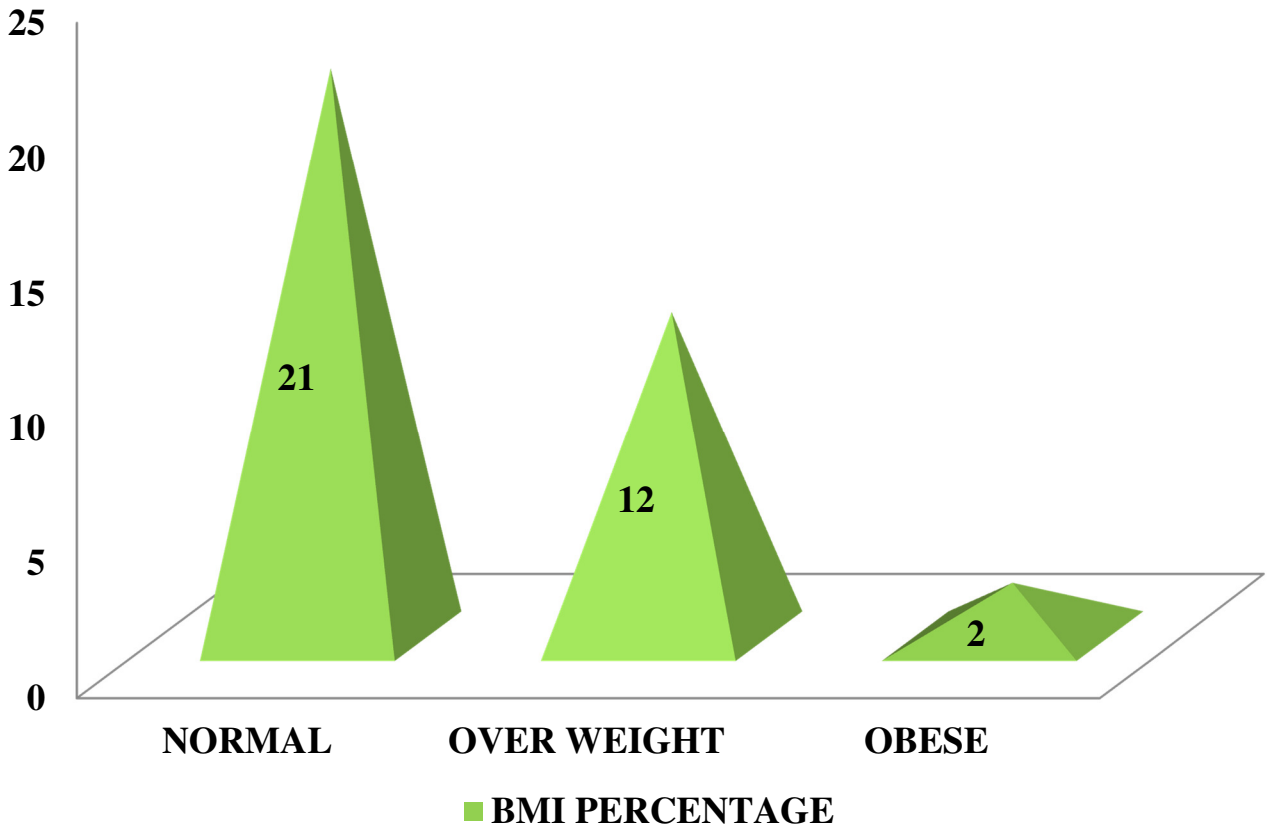


Chart 8 shows that 21 cases (60%) were Normal, 12 (34.20%) Overweight and 2 (5.71%) obese.

Table 7: BMI distribution in Female patients

SL.NO	BMI	NO.OF CASES (n=35)	PERCENTAGE %
1.	NORMAL	19	54.29
2.	OVERWEIGHT	13	37.14
3.	OBESE	3	8.57

In the BMI Evaluation in 35 female cases, 19 cases were in Normal BMI category, 13 cases were in over weight category, and 3 cases were in obese category.

Chart 9: BMI distribution in Female patients

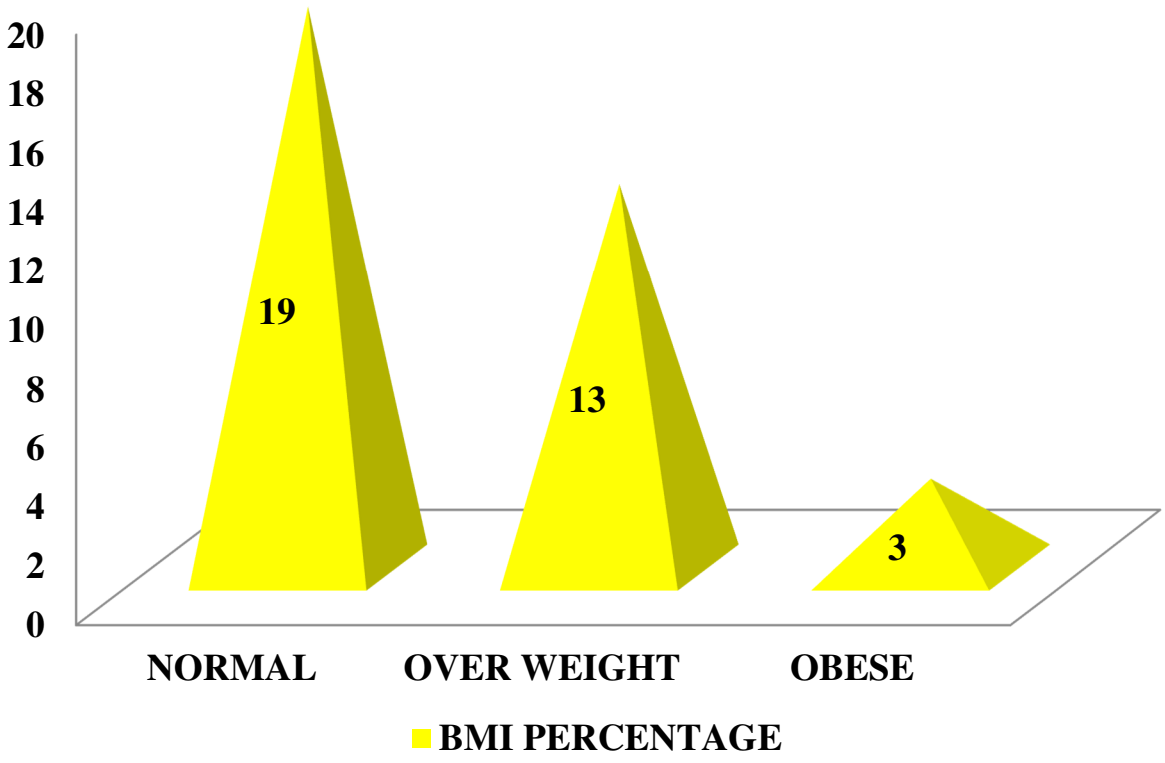


Chart 9 shows that in our study group, out of 35 females 19 (54.29%) were in normal, 13 (37.14%) were in overweight, and 3 (8.57%) were in obese category.

Chart 10: Comparison of BMI in Males and Female patients

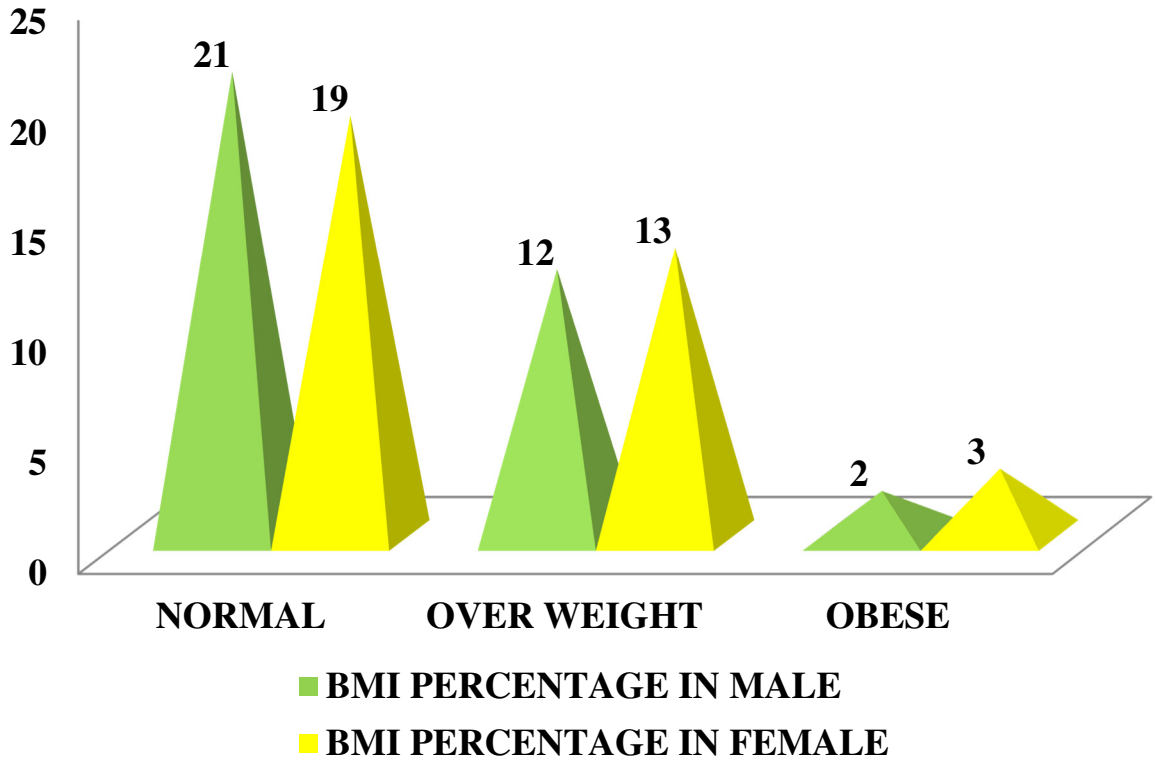


Chart 10 shows the comparative result of BMI in male and female patients of our study. During this evaluation of 70 cases. 40 cases (21 males and 19 females) were in normal BMI category, 25 cases (12 males and 13 females) were in over weight category, and 5 cases (2 males and 3 females) were in obese category.

LIPID PROFILE in Male and Female patients

Total cholesterol > 200 mg%, LDL >100 mg% and HDL <40 mg% is considered as dyslipidaemia.

Table 8: Total Cholesterol levels in Male patients

SL.NO	TOTAL CHOLESTEROL LEVEL	NO.OF CASES (n=35)	PERCENTAGE %
1.	NORMAL	9	25.71
2.	HIGH	26	74.29

In the study 26 out of 35 male cases (74.29%) had High total cholesterol values and 9 out of 35 (25.71%) had normal cholesterol values.

Table 9: LDL levels in Male patients

SL.NO	LDL LEVEL	NO.OF CASES (n=35)	PERCENTAGE %
1.	NORMAL	1	2.85
2.	HIGH	34	97.14

In our study 34 out of 35 male patients (97.14%) were having High LDL and only 1 out of 35 (2.85%) had Normal LDL.

Table 10: HDL levels in Male patients

SL.NO	HDL LEVEL	NO.OF CASES (n=35)	PERCENTAGE %
1	NORMAL	19	54.28
2	LOW	16	45.71

In the study 19 out of 35 male cases (54.28%) had Normal HDL and 16 out of 35 (45.71%) had low HDL.

CHART 11: Lipid Profile in Male patients

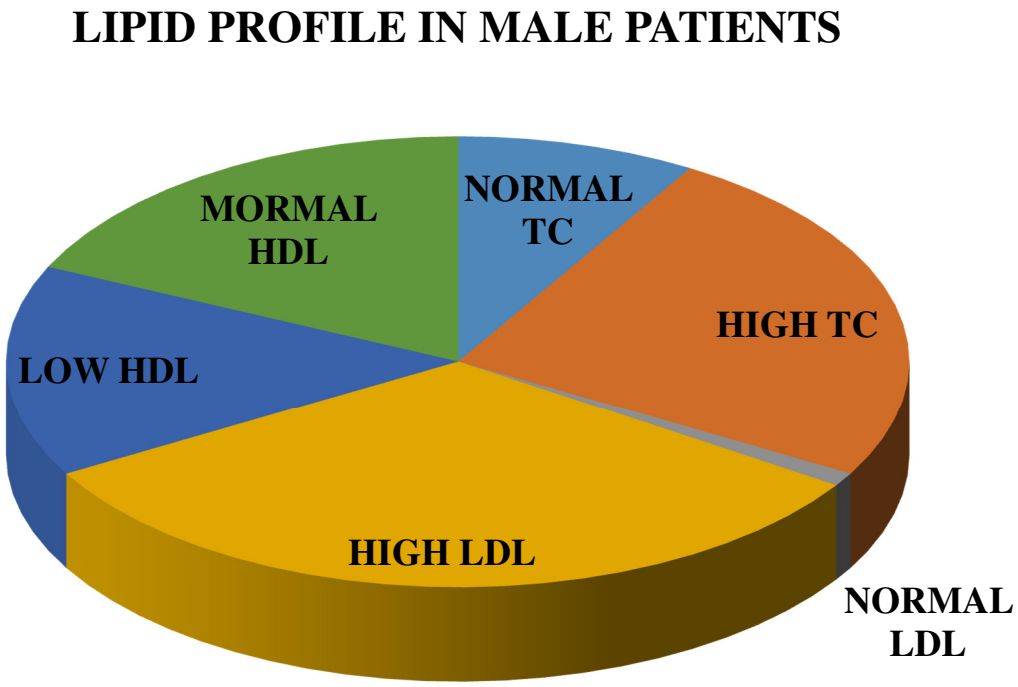


Chart 11 displays the pattern of lipid profiles in male patients. 74.29% had High total cholesterol values, 97.14% were having High LDL and 45.71% had low HDL.

Table 11: Total Cholesterol levels in Female patients

SL.NO	TOTAL CHOLESTEROL LEVEL	NO.OF CASES (n=35)	PERCENTAGE %
1.	NORMAL	8	22.85
2.	HIGH	27	77.14

In this study 27 out of 35 female cases (77.14%) were having High cholesterol and 8 out of 35 (22.85%) were having normal cholesterol.

Table 12: LDL levels in Female patients

SL.NO	LDL LEVEL	NO.OF CASES (n=35)	PERCENTAGE %
1	NORMAL	7	20
2	HIGH	28	80

In this study 28 out of 35 female cases (80%) were having High LDL and 7 out of 35 (20%) were having Normal LDL.

Table 13: HDL levels in Female patients

SL.NO	HDL LEVEL	NO.OF CASES (n=35)	PERCENTAGE %
1.	NORMAL	14	40
2.	LOW	21	60

In this study 21 out of 35 female cases (60%) were having low HDL and 14 out of 35 (40%) were having normal HDL.

Chart 12: Lipid Profile in Female patients

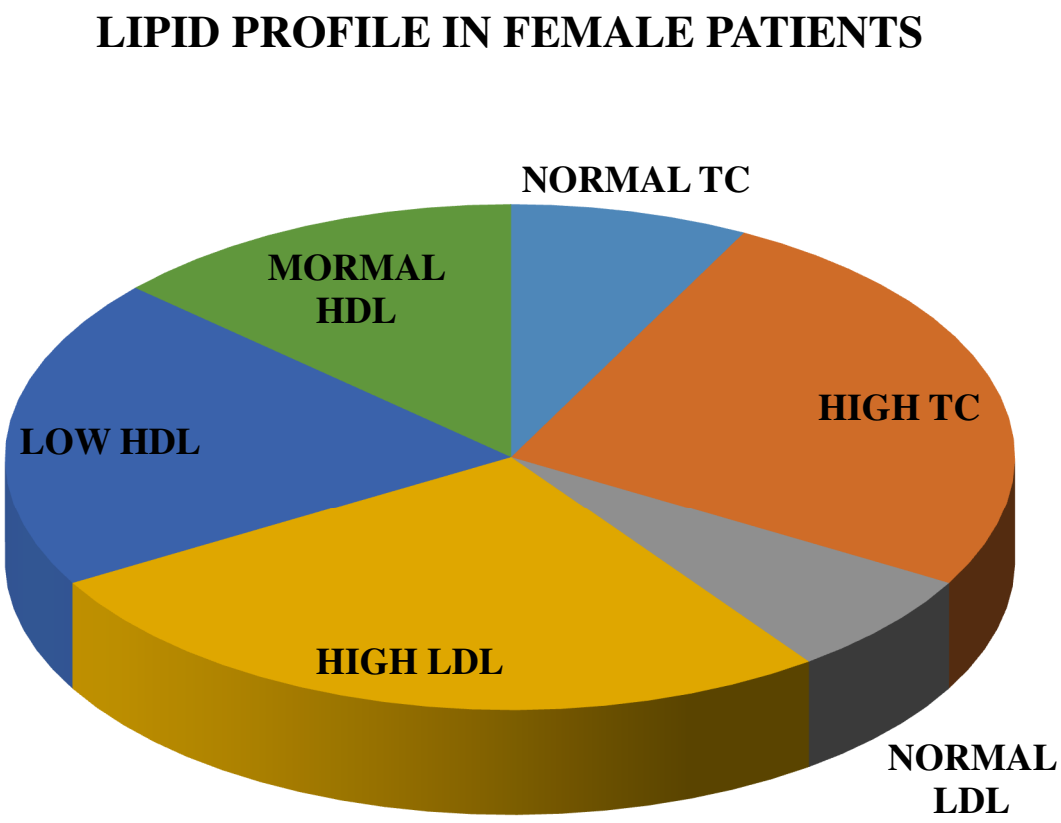


Chart 12 displays the pattern of lipid profiles in female patients. 77.14% had High total cholesterol values, 80% were having High LDL and 60% had low HDL.

Table 14: ECG features of CAD in Male patients

SL.NO	ECG	NO.OF CASES (n=35)	PERCENTAGE %
1.	STEMI	31	88.57
2.	NSTEMI	4	11.43

In this study, 31 cases out 35 cases in males (88.57%) had STEMI and 4 cases (11.43 %) had NSTEMI.

Chart 13: ECG features of CAD in Male patients

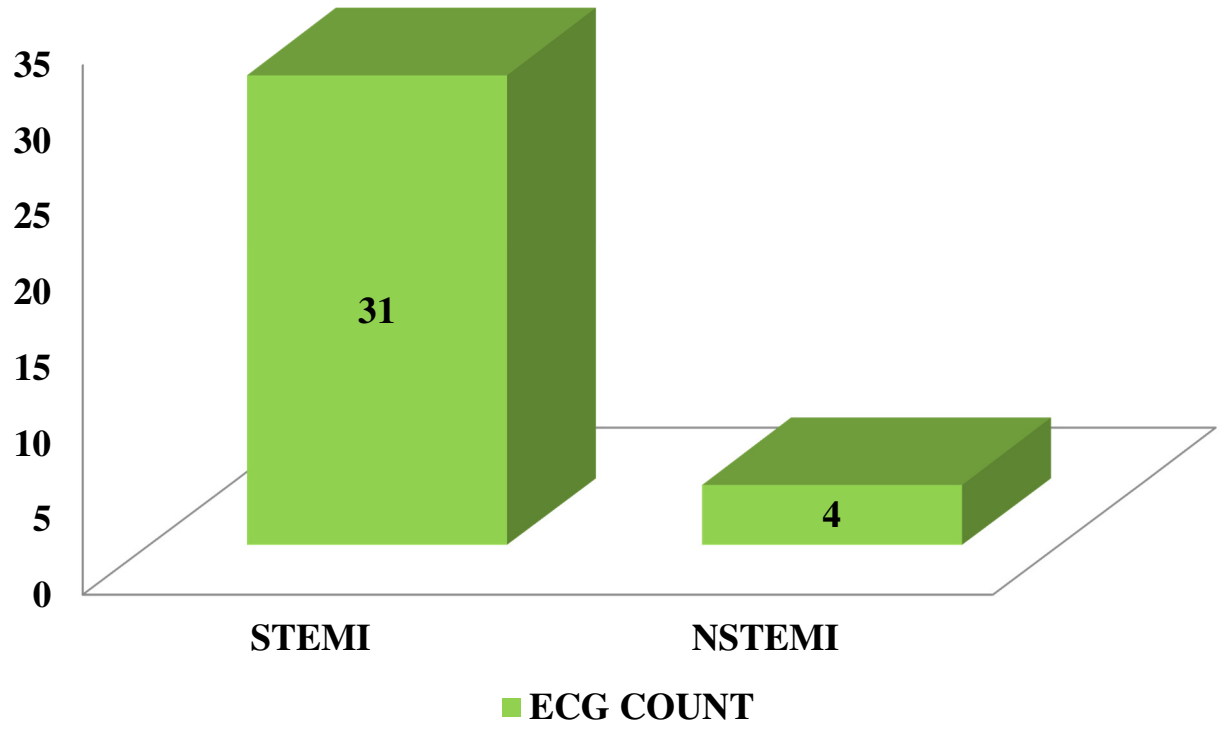


Chart 13 shows the ECG features of CAD in male patients. According to our study STEMI is more common in male patients.

Table 15: ECG features of CAD in Female patients

SL.NO	ECG	NO.OF CASES (n=35)	PERCENTAGE %
1.	STEMI	27	77.14
2.	NSTEMI	8	22.86

According to our study 77.14 % (27 out of 35 Females) had STEMI and 22.86 % (8 out of 35 females) had NSTEMI.

Chart 14: ECG features of CAD in Female patients

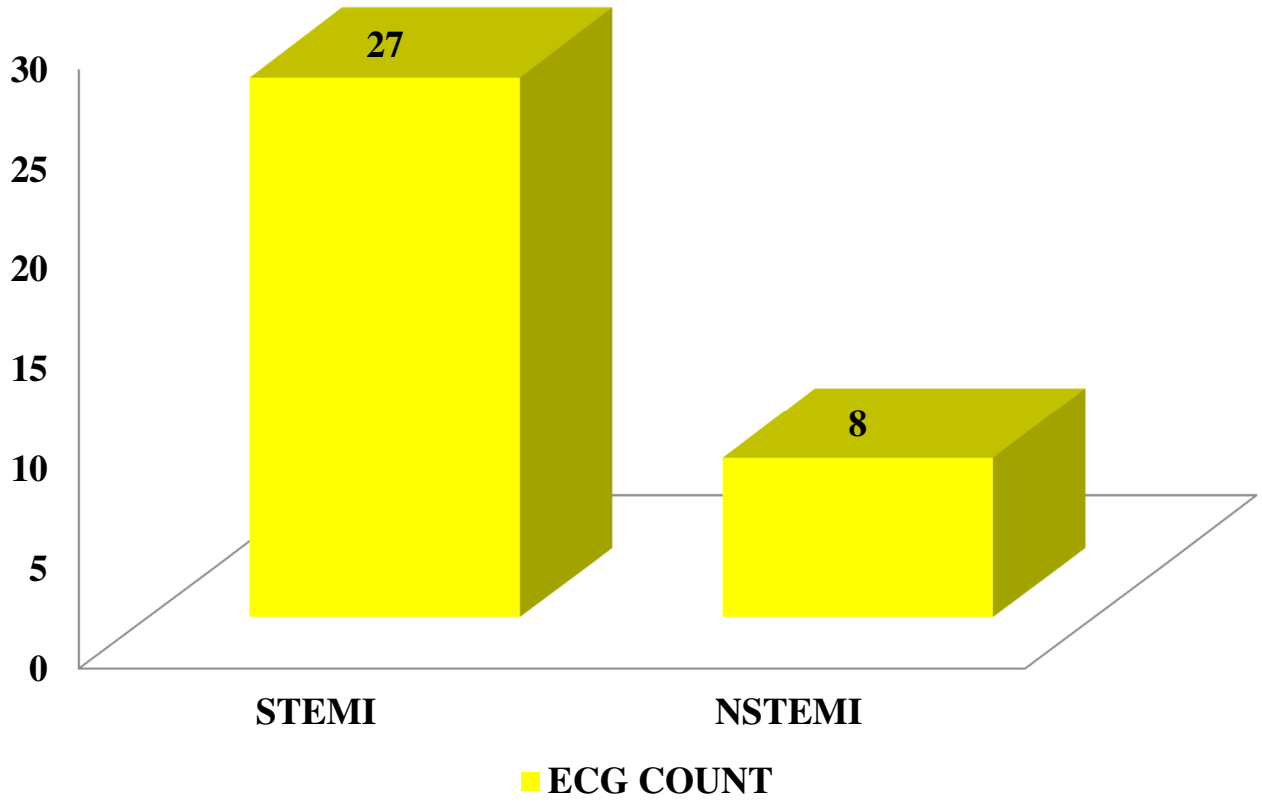


Chart 14 shows the ECG features of CAD in female patients. According to our study STEMI is more common in female patients.

Chart 15: Comparison of ECG features of CAD in Male and Female patients

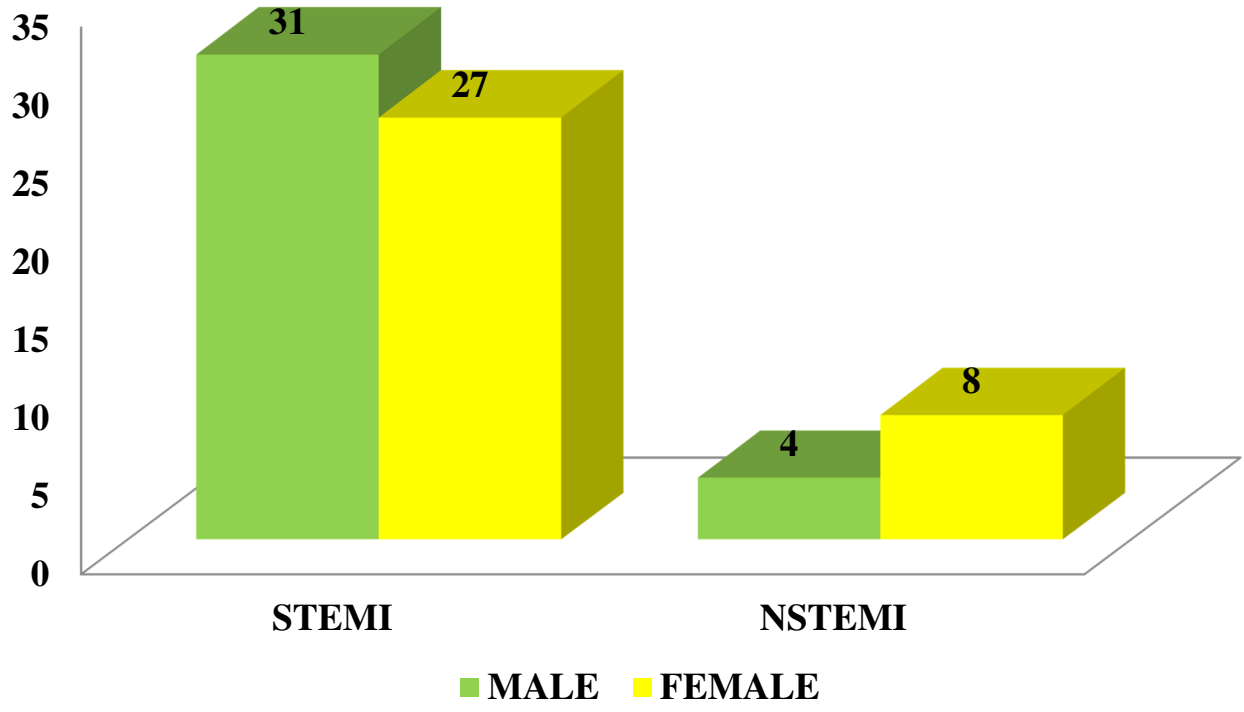


Chart 15 shows the comparison of ECG features between male and female patients. According to our study STEMI is the common presentation in both male and female patients and NSTEMI is more common in females than males.

Table 16: Type of MI in Male patients

SL.NO	WALL	NO.OF CASES (n=35)	PERCENTAGE %
1.	AWMI	17	48.57
2.	IWMI	4	11.43
3.	ASMI	6	17.14
4.	ALMI	2	5.71
5.	IWMI/RVMI	6	17.14

In this study of 35 male cases, 48.57% (17 out of 35) had AWMI, 17.14 % (6 out of 35) ASMI, 17.14 % (6 out of 35) IWMI/RVMI, 11.43 % (4 out of 35) IWMI and 5.71 % (2 out of 35) ALMI.

Chart 16: Type of MI in Male patients

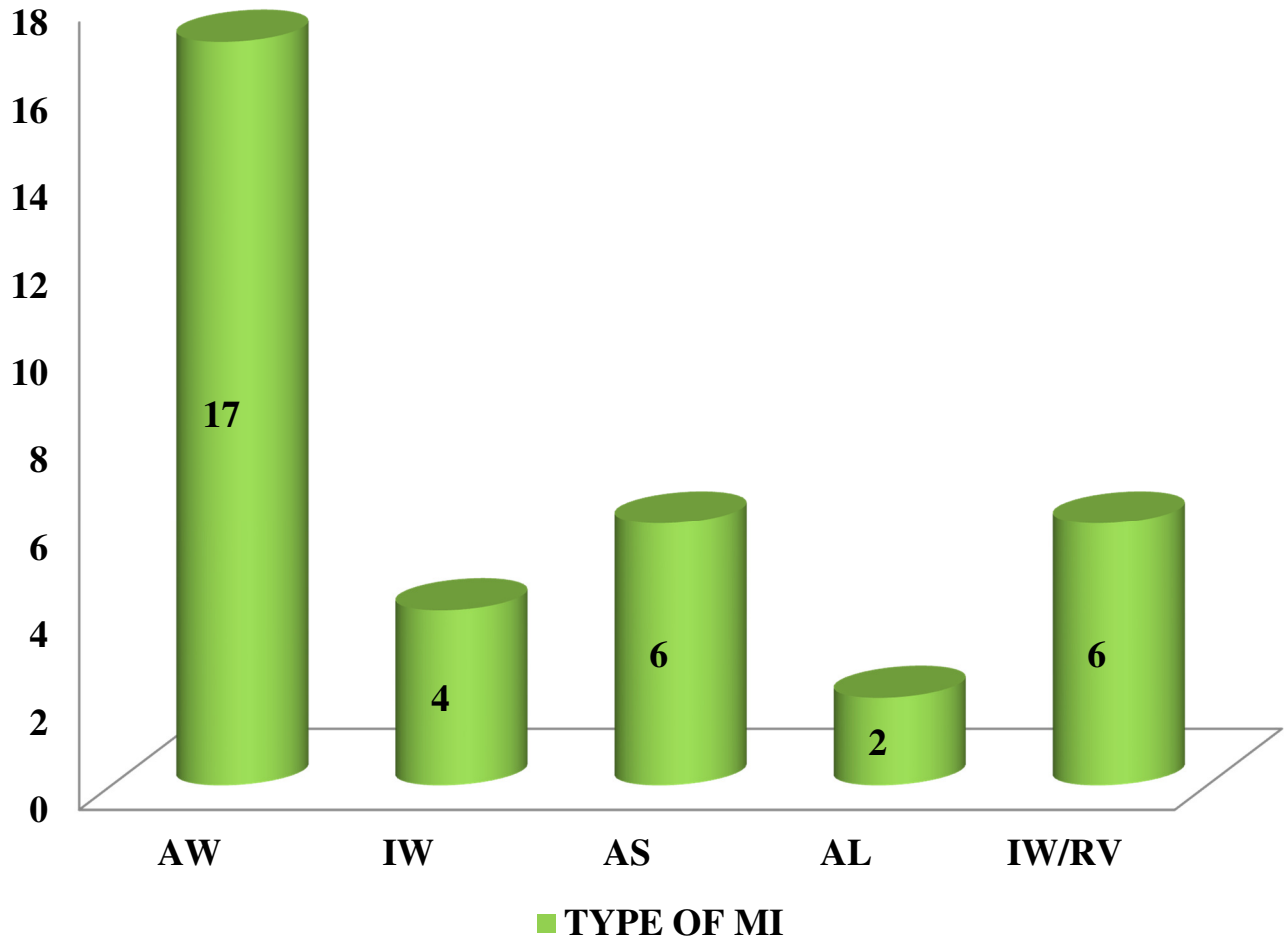


Chart 16 shows that in male patients AWMI is more common followed by ASMI and IWMI/RVMI

Table 17: Type of MI in Female patients

SL.NO	WALL	NO.OF CASES (n=35)	PERCENTAGE %
1.	AWMI	18	51.43
2.	IWMI	5	14.29
3.	ASMI	9	25.71
4.	ALMI	1	2.86
5.	IWMI/RVMI	2	5.71

In this study of 35 female cases 51.43% (18 out of 35) had AWMI, 25.71 % (9 out of 35) ASMI, 14.29 % (5 out of 35) IWMI and 5.71 % (2 out of 35) IWMI/RVMI and 2.86% (1 out of 35) ALMI.

Chart 17: Type of MI in Female patients

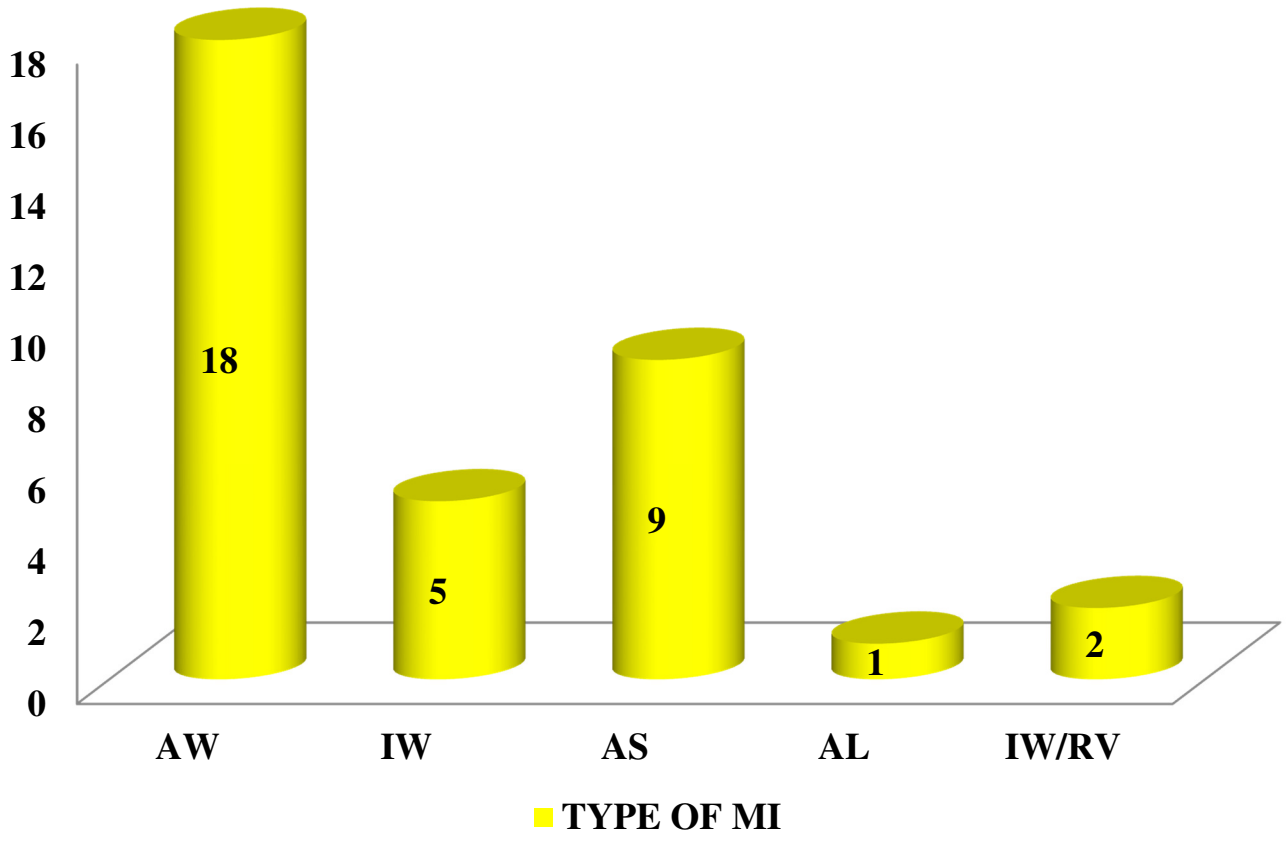


Chart 17 shows that in female patients AWMI is more common followed by ASMI and IWMI

Chart 18: Comparison of Type of MI in Male and Female patients

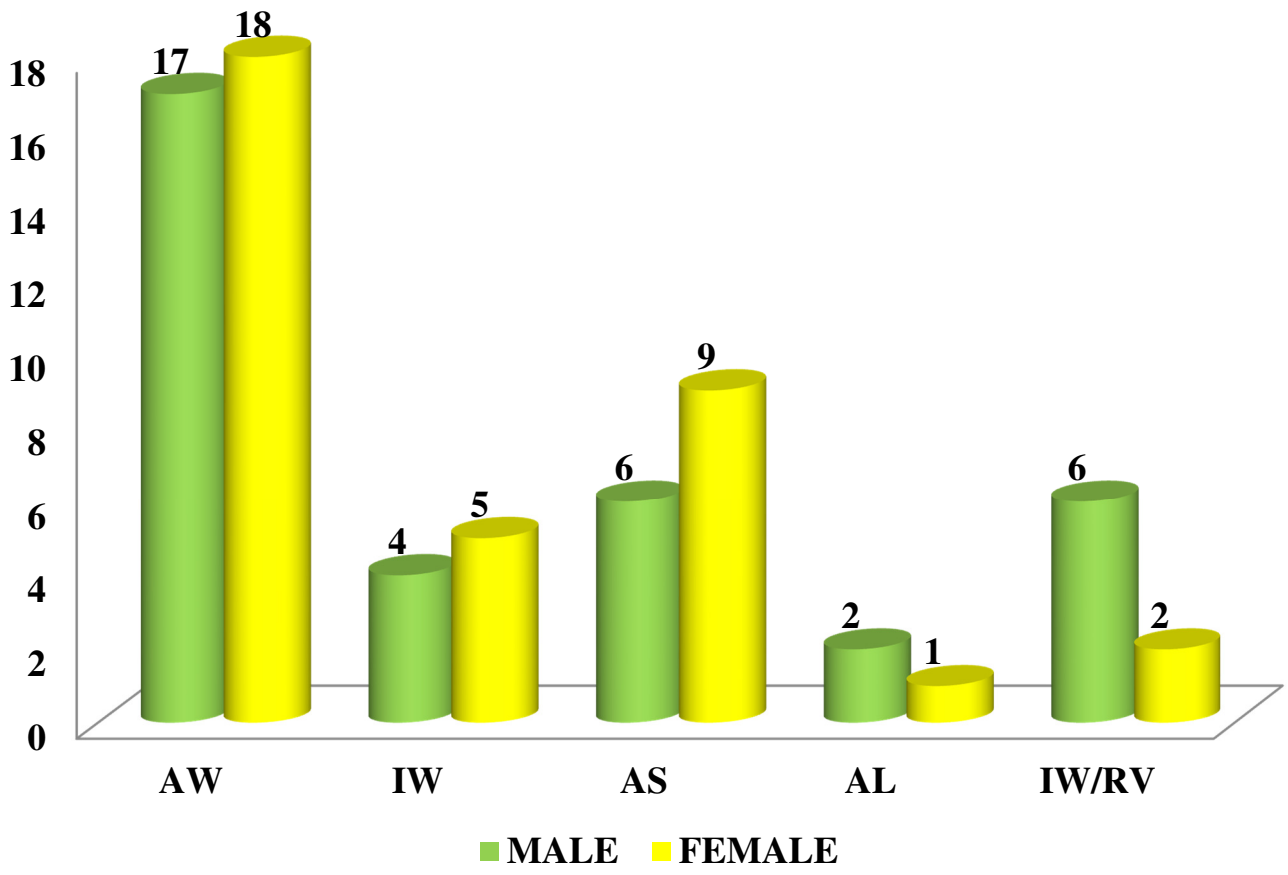


Chart 18 shows the comparison of type of MI between male and female patients. According to our study AWMI is the common presentation in both male and female patients, followed by ASMI.

Table 18: OUTCOME in Male patients

SL.NO	OUTCOME	NO.OF CASES (n=35)	PERCENTAGE %
1	RECOVERY	33	94.29
2	DEATH	2	5.71

In this study of 35 male patients, 94.29 %(33 out of 35) recovered and 5.71% (2 out of 35) died.

Chart 19: OUTCOME in Male patients

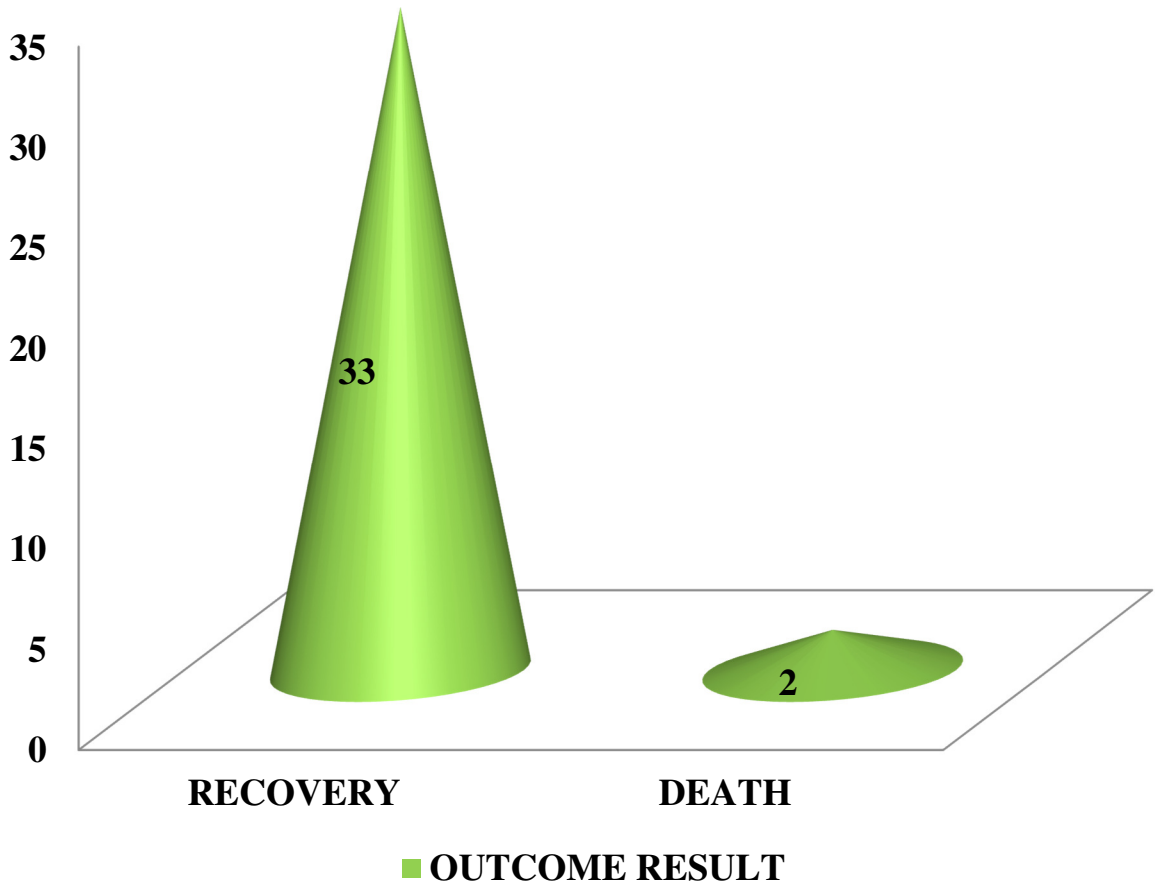


Chart 19 shows that in our study of 35 male patients with MI, 33 recovered with treatment while 2 patients died in spite of treatment.

Table 19: OUTCOME in Female patients

SL.NO	OUTCOME	NO.OF CASES (n=35)	PERCENTAGE %
1.	RECOVERY	31	88.57
2.	DEATH	4	11.43

In this study of 35 female patients, 88.57 %(31 out of 35) recovered and 11.43% (4 out of 35) died.

Chart 20: OUTCOME in Female patients

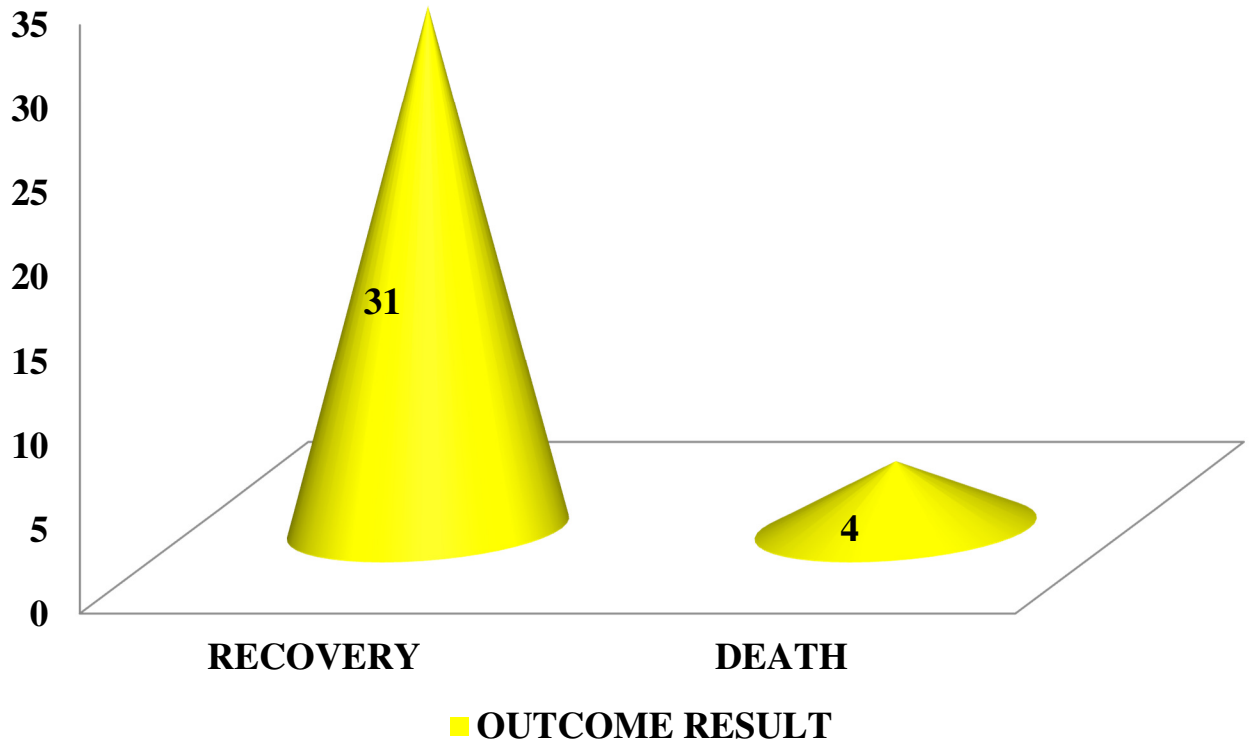


Chart 20 shows that in our study of 35 female patients with MI, 31 recovered with treatment while 4 patients died in spite of treatment.

Chart 21: Comparison of OUTCOME in Male and Female patients

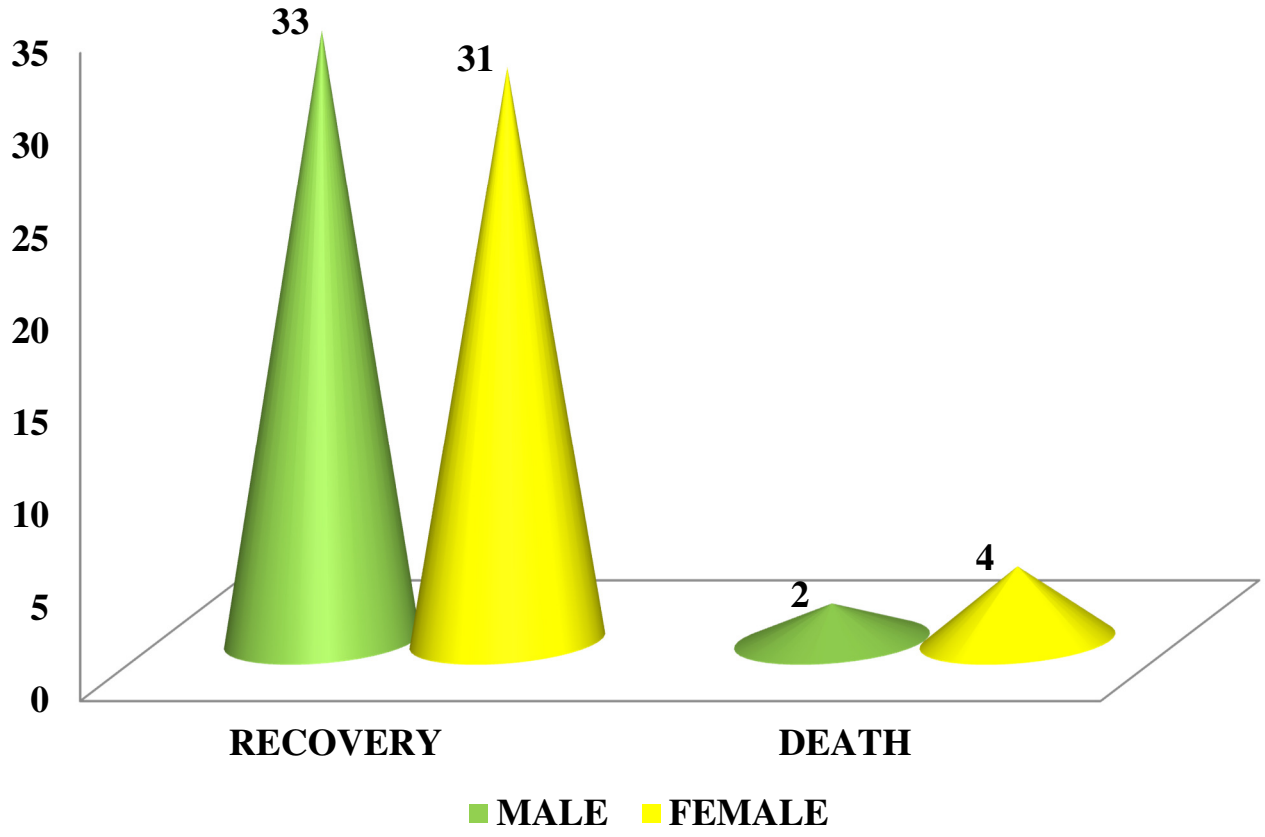


Chart 21 shows the comparison of outcome in male and female patients. In our study of 70 cases with MI there were 6 deaths. Mortality is more in female patients than males.

PLASMA FIBRINOGEN ASSAY

To find out the significance of plasma fibrinogen in coronary artery disease patients, plasma fibrinogen assay was done for 70 patients and entered into a master chart.

Values between 150 – 400 mg/dl is considered as normal, value greater than 400 is considered as high. Data analysis was done using software called Epidemiological Information Package.

Using this software, all the range, frequencies, percentage, mean, standard deviation, chi square and p value can be calculated. The tests used are One way ANOVA test and Student's 't' test for data and Kruskul Wallis Chi-square test for consolidated tables.

'p' value is calculated and value of less than 0.05 is considered significant.

Table 20: Plasma Fibrinogen levels in Male patients

SL.NO	FIBRINOGEN LEVEL	NO.OF CASES (n=35)	% IN MALE	p VALUE	ASSOCIATION
1	NORMAL	4	11.42	0.02	Significant
2	HIGH	31	88.57		

In this study of 35 male patients with MI, 88.57 %(31 out of 35) had high fibrinogen and 11.43% (4 out of 35) had normal fibrinogen. Here the calculated 'p'value is 0.02 which is <0.05 and hence the association is statistically significant.

Chart 22: Plasma Fibrinogen levels in Male patients

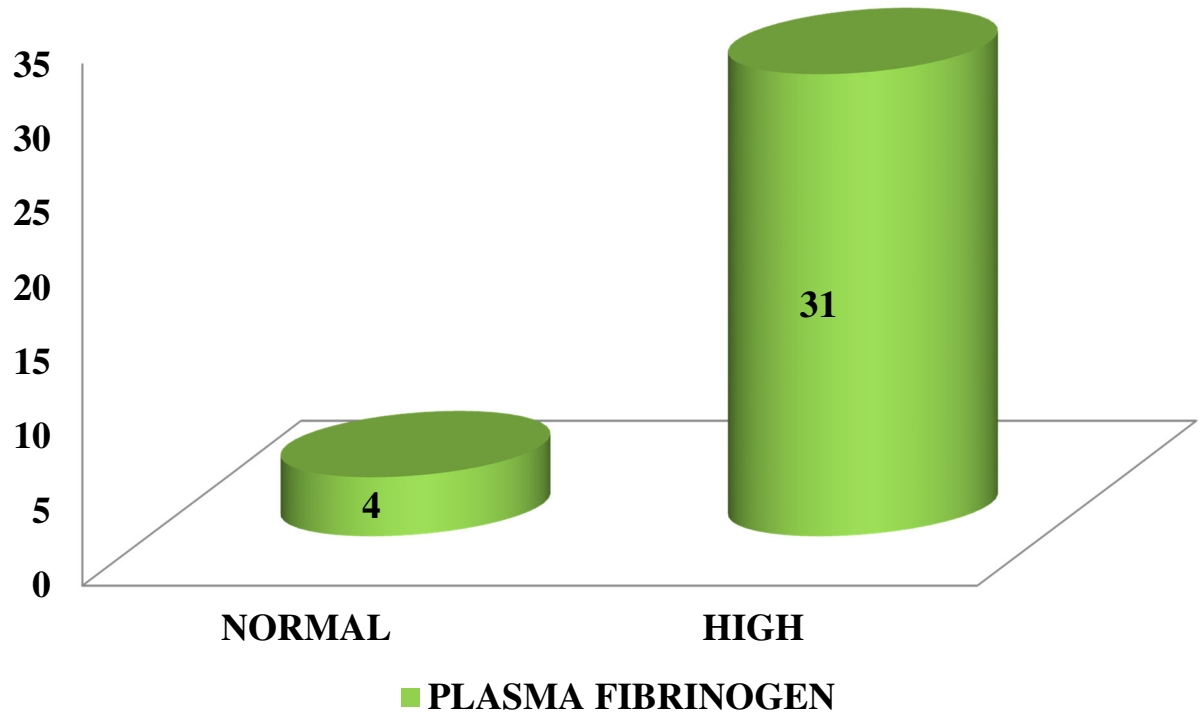


Chart 22 depicts the level of plasma fibrinogen in male patients with CAD. According to our study 88.57 %(31 out of 35) male patients had high fibrinogen levels and 11.43% (4 out of 35) male patients had normal fibrinogen levels.

Table 21: Plasma Fibrinogen levels in Female patients

SL.NO	FIBRINOGEN LEVEL	NO.OF CASES (n=35)	% IN FEMALE	p VALUE	ASSOCIATION
1.	NORMAL	5	14.28	0.001	Significant
2.	HIGH	30	88.71		

In this study of 35 female patients with MI, 85.71 %(30 out of 35) had high fibrinogen and 14.28% (5 out of 35) had normal fibrinogen. Here the calculated 'p'value is 0.001 which is <0.05 and hence the association is statistically significant.

Chart 23: Plasma Fibrinogen levels in Female patients

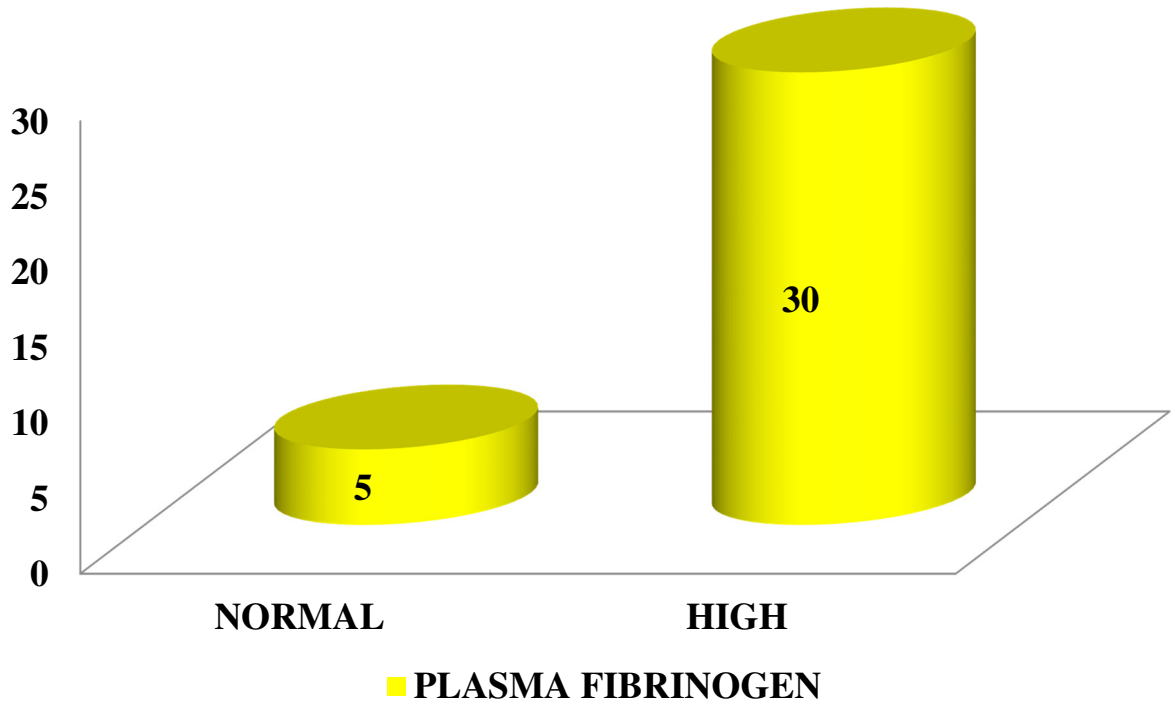


Chart 23 depicts the level of plasma fibrinogen in female patients with CAD. According to our study 85.71 %(30 out of 35) female patients had high fibrinogen levels and 14.28% (5 out of 35) female patients had normal fibrinogen levels.

Table 22: Comparison of Plasma Fibrinogen levels in Male and Female patients

SL.NO	FIBRINOGEN LEVEL	MALE	FEMALE	% IN MALE	% IN FEMALE	p VALUE IN MALE	p VALUE IN FEMALE
1	NORMAL	4	5	11.42	14.28	0.02	0.001
2	HIGH	31	30	88.57	85.71		

In our study of 70 patients with CAD (35males and 35 females), it was found that 88.57% (31 out of 35) of male patients had high fibrinogen and 85.71% (30 out of 35) of females had high fibrinogen.

The p value for male patients is 0.02, and for female patients is 0.001, both of which are less than 0.05, and hence the association is statistically significant.

Chart 24: Comparison of Plasma Fibrinogen levels in Male and Female patients

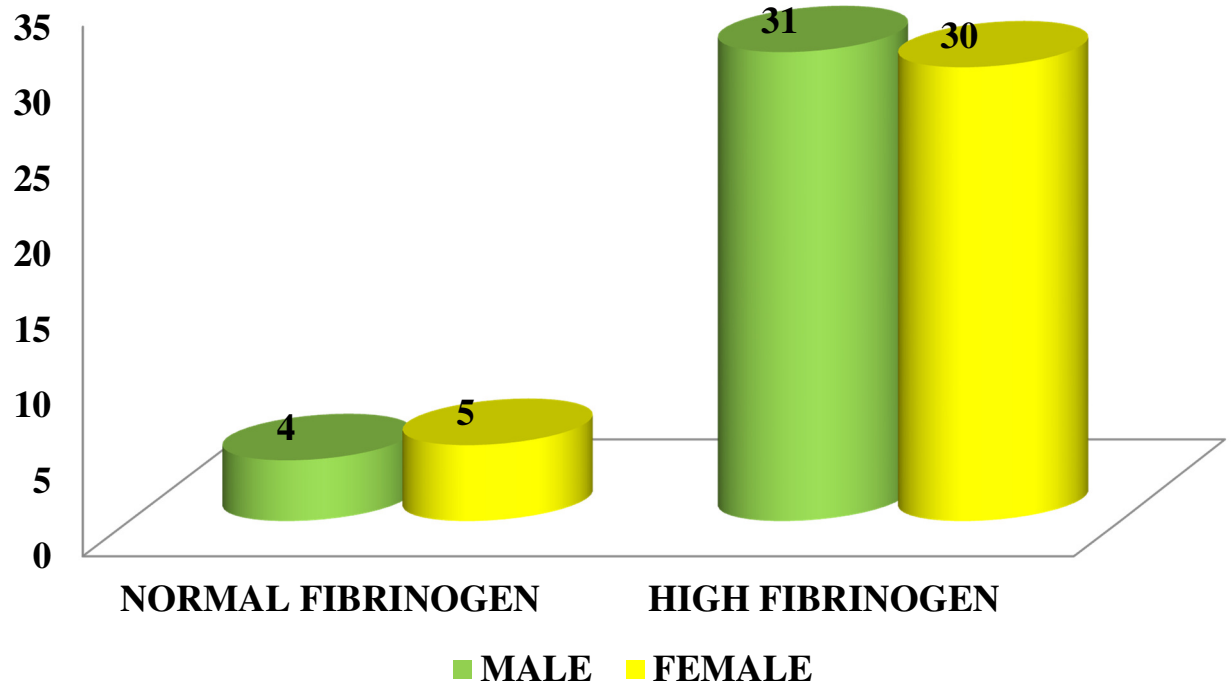


Chart 24 shows the comparative study of plasma fibrinogen levels in male and female patients with CAD. According to our study 88.57% (31 out of 35) of male patients had high fibrinogen and 85.71% (30 out of 35) of females had high fibrinogen.

DISCUSSION

DISCUSSION

Coronary artery disease (CAD) is the leading cause of death in developed countries and is rapidly becoming one in developing countries. For a long time, coronary artery disease (CAD) was considered as a disease of men and women were not included in the studies. In developing countries, CVD causes half of all deaths of women over 50 years of age and third of all deaths of women, worldwide. Also, women form a distinct subgroup within the patients with CAD because of differences between women and men with respect to prevalence, presentation, management and outcomes of the disease.

Also, traditional risk factors cannot explain all cases of CAD in our Indian population. The increased incidence of CAD in the young suggests the possibility of non-conventional risk factors.

In recent times, the role of plasma fibrinogen as an independent cardiovascular risk factor has been increasingly appreciated .Elevated plasma fibrinogen levels may reflect a prothrombotic or hypercoagulable state, as it is a major determinant of fibrin formation, blood viscosity and platelet aggregation. This increases the thrombogenic tendency and may lead to the development of atheromatous lesion in

CAD and may also cause the ruptured atheromatous plaques to occlude the lumen in patients with coronary artery disease.

But very few studies are available to establish the relationship between plasma fibrinogen and coronary artery disease in women.Hence this study was undertaken to evaluate the role of plasma fibrinogen as a determinant for CAD in women.

Seventy patients including both male and females admitted to coronary care unit with evidence of acute myocardial infarction features in electrocardiogram were randomly selected and data collected with the follow up during the hospital stay of patients. Plasma fibrinogen level were measured in all the patients.

Diabetes mellitus is an important confounder in the relationship between plasma fibrinogen and CAD. Another potential confounder is smoking. So patients with diabetes and smokers were excluded from this study. This was done to ensure that the effect of plasma fibrinogen on cardiovascular risk is not simply the result of cigarette smoking or diabetes mellitus. Thus, we provide evidence that plasma fibrinogen is associated with increased risk of female CAD, independent of potentially confounding cardiovascular risk factors. Also, women on HRT, OCP, and drugs that affects fibrinogen levels were excluded from this study.

- In this study the average age of males were 56.05 and average age of females were 64.17. Among male patients, the incidence of MI is more in age group 45-55yrs (42.86%) whereas in females, it is in 65-75 age group (51%).

  Women of advanced age develop more complications and mortality.

  Johanne Neil et al state that the excess mortality in women is due to olderage of presentation in women

- Women having an MI are more likely to present with atypical chest pain (midback pain) and atypical symptoms (indigestion, nausea, vomiting and dyspnea).

  In the FHS, among women with typical angina,only 17% developed MI while 44% of men with angina developed MI

  In the Coronary Artery Surgery Study (CASS), 83% of men with typical angina had significant CAD while only 50% of women with typical angina had significant CAD

  In our study 25.71% of male patients had atypical symptoms on presentation, while 65.71% of female patients presented with atypical symptoms.

❖ Unique to women is the influence of their hormonal status on CAD. In comparison with men of a similar age and postmenopausal women, the incidence of CAD is significantly lower in premenopausal women suggesting that endogenous estrogens have a protective effect on the development of CAD.

In our study 91.43% of female patients were in post-menopausal status.

❖ The annual prevalence of obesity among U.S. adults age 20 and older has increased from 19.4% in 1997 to 23.9% in 2002 (Centers for Disease Control and Prevention, 2003). For the first six months of 2003, the prevalence of obesity among women was highest among non-Hispanic black women (38.7%), followed by Hispanic or Latino women (25.7%).

During this evaluation of 70 cases. 40 cases (21 males and 19 females) were in normal BMI category, 25 cases (12 males and 13 females) were in over weight category, and 5 cases (2 males and 3 females) were in obese category.

The JAIPUR HEART WATCH (JHW) studies reported that there is a significant increase in total cholesterol, LDL cholesterol and triglycerides and a decline in HDL cholesterol is women and men at all age groups.

In our study, among male patients. 74.29% had High total cholesterol values, 97.14% were having High LDL and 45.71% had low HDL. Among female patients. 77.14% had High total cholesterol values, 80% were having High LDL and 60% had low HDL.

- According to our study STEMI is the common presentation in both male (88.57%) and female (77.14 %) patients and NSTEMI is more common in females (22.86 %) than males (11.43 %).

- According to our study the most common pattern of presentation in both male and female patients is Anterior Wall Myocardial Infarction, followed by Anteroseptal Wall Myocardial Infarction.

- In our study of 70 cases with MI there were 6 deaths. Mortality is more common in female patients than males. This is because women classically present at an advanced age, with atypical symptoms resulting in a delay of initiation of treatment or inadequate treatment leading to poor short term outcome. There is a significant delay in reaching the treatment care center.

Sandra et al state that, women receive somewhat less aggressive treatment during the early management of acute myocardial infarction.

Hani Jneid et al state that the under use of evidence based treatments and delayed reperfusion among women represent potential opportunities for reducing poor outcomes after AMI.

- In our study of 70 patients with CAD (35males and 35 females), it was found that 88.57% (31 out of 35) of male patients had high fibrinogen and 85.71% (30 out of 35) of females had high fibrinogen.

  The p value for male patients is 0.02, and for female patients is 0.001, both of which are less than 0.05, and hence the association is statistically significant.

In the Atherosclerosis Risk in Communities (ARIC) Study, a large, population-based, prospective study, plasma fibrinogen was found to be an important risk factor for CAD in women. Elevated plasma fibrinogen was also associated with all-cause mortality in this population.

The Scottish Heart Health Study, a random population sample with a follow-up period of ≈8 years, recently reported plasma fibrinogen to be a risk factor for CAD mortality and all-cause mortality in women.

In a Finnish population-based, case-control study, women with prevalent CAD had higher plasma fibrinogen concentrations than with women free of disease.

Our study is a cross sectional observational study. So it has its own limitations. Cross sectional studies are susceptible to several sources of bias and confounding. There may be many shortcomings in this study. But this study will definitely give us a fair idea about the association of plasma fibrinogen with CAD in female patients.

SUMMARY

SUMMARY

In our study of 70 patients (35 male, 35 female) with acute myocardial infarction. It was found that

- Among male patients, the incidence of MI is more in age group 45-55yrs (42.86%) whereas in females, it is in 65-75 age group (51%).

- Typical symptoms are predominant in males while atypical symptoms are major presenting complaints in females.

- Majority of female (91%) patients were in post-menopausal status.

- STEMI is the common presentation in both male and female patients and NSTEMI is more common in females than males.

- Anterior Wall Myocardial Infarction is the common presentation in both male and female patients, followed by Anteroseptal Wall Myocardial Infarction.

- Mortality is more in female patients than males.

- Plasma fibrinogen was high in both male (Mean 424.59) and female (Mean 427.97) patients and association was statistically significant.

CONCLUSION

CONCLUSION

Coronary Artery Disease continues to take a heavy toll on the Indian population. But not all cases of CAD can be explained by conventional risk factors. Hence the search for novel risk factors is warranted to reduce the cardio vascular disease burden in the community.

The role of plasma fibrinogen as an independent cardio vascular risk factor has been increasingly recognized in recent years. But the association between plasma fibrinogen and cardiovascular risk does not establish a cause-effect relation, because plasma fibrinogen levels are related to several major lifestyle and physical characteristics known to be associated with increased risk of CAD.

But more research is still needed to find out the value of measuring plasma fibrinogen levels in clinical practice and identifying 'high fibrinogen' genotypes in cardiovascular health screening. However, routine measurement of plasma fibrinogen levels has to take into account the influence of age, sex, smoking and other disease states (like renal and liver impairment) on the measured levels in the individuals screened.

At present, there are limited therapeutic strategies for reducing plasma fibrinogen. Therefore routine clinical measurement of this marker may be of limited value. In addition, an internationally accepted standardised procedure for measurement of plasma fibrinogen, and the initiation long-term prospective studies (especially into effects of reducing high plasma fibrinogen levels) are needed. A full understanding of the role of plasma fibrinogen in cardiovascular disorders is still required in elucidating the molecular biology of atherogenesis and thrombogenesis.

LIMITATIONS:

Our study has some limitations.

- Although other chronic conditions that may influence fibrinogen synthesis were excluded, the possibility that the observed elevated fibrinogen was a result, rather than a cause of atherosclerosis, cannot be ruled out.

- Since the majority of individuals enrolled were dyslipidemic, the results are mainly valid for this specific vascular risk subgroup.

- In this study, we tried to adjust for some but not all the possible confounders. It is known that other genetic, metabolic and environmental

factors not included in the present analysis could influence the fibrinogen levels.

- Finally, the sample size means that the results cannot automatically be extended to other populations at risk for CAD.

In conclusion, the findings from our study provide evidence that plasma fibrinogen is associated with excess risk of CAD in women. It seems likely that high plasma fibrinogen levels, whatever their origins, contribute substantially to the risk of coronary thrombotic events in women. Further large scale studies are needed to establish the causal relationship of fibrinogen to coronary artery disease in both the sexes.

BIBLIOGRAPHY

BIBLIOGRAPHY

1. Ross R. Atherosclerosis—an inflammatory disease. *N Engl Med*1999; 340:115-126.

2. Danesh J, Collins R, Appleby P, Peto R. Association of fibrinogen, C-reactive protein, albumin, or leukocyte count with coronary heart disease—meta-analyses of prospective studies. *JAMA* 1998; 279:1477–1482.

3. Ernst E, Koenig W. Fibrinogen and cardiovascular risk. *Vasc Med* 1997; 2: 115–125.

4. Meade TW, Brozovic M, Chakrabarti RR, et al. Hemostatic function and ischemic heart disease: principal results of the Northwick Park Heart Study. *Lancet*. 1986; 6:533–537.

5. Kannel WB, Wolf PA, Castelli WP, et al. Fibrinogen and risk for cardiovascular disease. *JAMA*. 1987;258:1183–1186

6. Green D, Ruth K, Folsom AR, et al. Hemostatic factors in the Coronary Artery Risk Development in Young Adults (CARDIA) study. *Arterioscler Thromb*. 1994; 14:686–693.

7. Barasch E, Benderly M, Graff E, et al, for the principal investigators of the BIP Study Group. Plasma fibrinogen levels and their correlates in 6457 coronary heart disease patients: the Bezafibrate Infarction Prevention (BIP) study. *J Clin Epidemiol*. 1995; 48:757–765.

8. Lee AJ, Lowe GDO, Woodward M, et al. Fibrinogen in relation to personal history of prevalent hypertension, diabetes, stoke, intermittent claudication, coronary heart disease, and family history: the Scottish Heart Health Study. *Br Heart J*. 1993; 69:338 –342.

9. Heinrich J, Balleisen L, Schulte H, et al. Fibrinogen and factor VII in the prediction of coronary risk: results from the PROCAM study in healthy men. *Arterioscler Thromb*. 1994; 14:54 –59.

10. Becker RC, Cannon CP, Bovill EG, Tracy RP, Thompson B, Knatterud GL, Randall A, Braunwald E, for the TIMI III investigators. Prognostic value of

plasma fibrinogen concentration in patients with unstable angina and non-Q-wave yocardial infarction (TIMI IIIB trial). *Am J Cardiol* 1996; 78:142–147.

11. Toss H, Lindahl B, Siegbahn A, Wallentin L, for the FRISC Study Group. Prognostic influence of increased fibrinogen and C-reactive protein levels in unstable coronary artery disease. *Circulation* 1997;96:4204–4210

12. Woodward M, Lowe GDO, Rumley A, Tunstall-Pedoe H. Fibrinogen as a risk factor for coronary heart disease and mortality in middle-aged men and women: the Scottish Heart Health Study. Eur Heart J 1998; 19:55-62.

13. Kannel WB, Wolf PA, Castelli WP, D'Agostino RB. Fibrinogen and risk of cardiovascular disease. The Framingham Study. JAMA. 1987; 258: 1183-1186.

14. Kannel WB, D'Agostino RB, Wilson PW, Belanger AJ, Gagnon DR. Diabetes, fibrinogen, and risk of cardiovascular disease: the Framingham experience. Am Heart J. 1990; 120: 672-676.

15. Stec JJ, Silbershatz H, Tofler G, Matheney TH, Sutherland P, Lipinska I, et al. Association of fibrinogen with cardiovascular risk factors and cardiovascular disease in the Framingham offspring population. Circulation 2000; 102:1634-8.

16. Ernst E, Koening W. Fibrinogen and cardiovascular risk. Vasc Med 1997; 2:115-25.

17. Hoffmeister A, Rothenbacher D, Bäzner U, Frölich M, Brenner H, Hombach V, et al. Role of novel inflammatory markers of inflammation in patients with stable coronary heart disease. Am J Cardiol 2001; 87:262-6.

18. Jose J, Selvakumar D, Selvakumar R, Kanagasapabathy AS, Jeyaseelan L. Plasma fibrinogen – An independent risk factor for ischaemic heart disease. Indian Heart J 1998; 50: 45-8.

19. Meilahn E.Hemostatic factors and risk of cardiovascular disease in women.Arch Pathol Lab Med.1992;116:1313-17

20. Cook NS, Ubben D. Fibrinogen as a major risk factor in cardiovascular disease. Trends Pharmacol Sci. 1990; 11: 444-45

21. Folsam A,Wu K,Rosamond W,Sharret A,Chambless L.Prospective study of hemostatic factors and incidence of coronary heart disease;the ARIC study.Circulation.1997;96:1102-08

22. Ernst E,Resch KL.Fibrinogen as a cardiovascular risk factor:a meta-analysis and review of literature.Ann Intern Med.1993;118:956-63

23. Smith EB. Fibrinogen, fibrin and fibrin degradation products in relation to atherosclerosis. Clin Haematol. 1986; 15: 355-37

24. Cremer P, Nagel D, Seidel D, van de Loo JC, Kienast J. Considerations about plasma fibrinogen concentration and the cardiovascular risk: combined evidence from the GRIPS and ECAT studies. Goettingen Risk Incidence and Prevalence Study. European Concerted Action on Thrombosis and Disabilities. Am J Cardiol. 1996; 78: 380-38

25. Bush TL. The epidemiology of cardiovascular disease in postmenopausal women. Ann N Y Acad Sci 1990; 592: 263-27

26. Ridker PM, Hennekens CH, Buring JE, Rifai N. C-reactive protein and other markers of inflammation in the prediction of cardiovascular disease in women. N Engl J Med 2000; 342: 836-843

27. Kannel WB, D'Agostino RB, Belanger AJ. Fibrinogen, cigarette smoking, and risk of cardiovascular disease: insights from the Framingham study. Am Heart J. 1987;113:1006-101

28. SB, Singh H, Sharma D. Profile of young acute myocardial infarction in Haryana. J Assoc Physicians India 1998; 47(6): 654.

29. Alpert JS, Thygeson K, Antman E. Myocardial infarction redefined: A consensus document of The Joint European Society of ardiology/American College of Cardiology Committee for the redefinition of myocardial infarction. J Am Coll Cardiol 2000; 36: 9592.

30. Enas A Enas, Jatinder Dhawan, Sanjiv Puthar. Coronary Artery Disease in Indians. Indian Heart J 1997; 49: 25-34.

31. Singh SP, Sen P. Coronary heart disease. The changing scenario. Indian J Prev Soc Med 2005; 34: 71-84.

32. Barrett-Conner E, Giardina E, Gitt U, Tschoepe D. Women and heart disease:the role of diabetes and hyperglycemia. Arch Intern Med 2004; 164:934-942.

33. Charney P ed. Coronary artery disease in Women: prevention, Diagnosis and Management. Philadelphia: American College of Physicians:1999

34. Jaffe AS, Babuin L, Apple FS: Biomarkers in acute cardiac disease: The present and the future. J Am Coll Cardiol 2006; 48:1.

35. Giannitsis E, Katus HA: Biomarkers of necrosis for risk assessment and management of ST-elevation myocardial infarction. In: Morrow DA, ed.

Cardiovascular Biomarkers: Pathophysiology and Disease Management, Totowa, NJ: Humana Press; 2006:119-128.

36. Antman EM, Anbe DT, Armstrong PW, et al: ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction: A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee to Revise the 1999 Guidelines for the Management of patients with Acute Myocardial Infarction).

37. Kyker KA, Limacher MC. Gender differences in the presentation and symptoms of coronary artery disease. Curr Womens Health Rep2002; **2(2)**: 115-9.

38. Louise Pilote, Kaberi Dasgupta, Veena Guru, Karin H. Humphries, Jennifer McGrath. A comprehensive view of sex-specific issues related to cardiovascular diseas CMAJ 2007; 176(6 suppl): S1-44.

39. Kannel WB, Sorlie P, McNamara PM. Prognosis after initial myocardial infarction: the Framingham study. Am J Cardiol 1979; 44(1): 53-9.

40. Malacrida R, Genoni M, Maggioni AP, Spataro V, Parish S, Palmer A, et al. A comparison of the early outcome of acute myocardial infarction in women and men. The Third International Study of Infarct Survival Collaborative Group.N Engl J Med. 1998; 338:8-14.

41. Vaccarino V, Krumholz HM, Berkman LF, Horwitz RI. Sex differences in mortality after myocardial infarction: is there evidence for an increased risk for women? Circulation 1995; 91:1861-71.

42. Marrugat J, Sala J, Masia R, Pavesi M, Sanz G, Valle V, et al. Mortality differences between men and women following first myocardial infarction. JAMA. 1998; 280:1405-9.

43. Johanne Neill, Jennifer Adgey. Predictors of excess mortality after myocardial infarction in women. Ulster Med J 2008; **77 (2)** 89-96.

44. Peter T, Harper R, Luxton M, Penington C, Sloman JG. Acute myocardial infarction in women. The influence of age on complications and mortality. Med J Aust. 1978; 1:189-91.

45. Sandra C, shellik beaver, peter M, Richard D, Herschel W, Eighton chan. Treatment of acute myocardial infarction and 30-day mortality among women and men. NEJM 2000; 343:8-15.

46. Hani Jneid, Gregg C. Fonarow, Christopher P. Cannon, Adrian F. Hernandez, Igor F. Sex Differences in Medical Care and Early Death After Acute Myocardial infarction. Circulation 2008; 118; 2803-2810.

47. Allen P. Burke, Andrew Farb, Gray T. Malcom, You-hui Liang. Effect of Risk Factors on the Mechanism of Acute Thrombosis and Sudden coronary death in women. Circulation 1998; 97; 2110-2116

48. Stefanick M, Legault C, Tracy R, Howard G, Kessler C, Lucas D,Bush T. Distribution and correlates of plasma fibrinogen in middle-aged women: initial findings of the Postmenopausal Estrogen/Progestin Interventions (PEPI) Study. *Arterioscler Thromb Vasc Biol*. 1995; 15:2085–2093.

49. Ernst E. Lowering fibrinogen therapeutically. In: Ernst E, Koenig W, Lowe GDO, Meade TW, eds. *Fibrinogen: a "New" Cardiovascular Risk Factor*. Vienna, Austria: Blackwell; 1992:358 –361.

50. Salomaa V, Rasi V, Peekanen J, Vahtera E, Jauhiainen M, Vartiainen E, Myllyla¨ G, Ehnholm C. Haemostatic factors and prevalent coronary heart disease: the FINRISK haemostasis study. *Eur Heart J*. 1994; 15:1293–1299.

51. Hamsten A, Blomba¨ck M, Wiman B, Svensson J, Szamosi A, de Faire U, Mettinger L. Haemostatic function in myocardial infarction. *Br Heart J*. 1986; 55:58–66.

52. Kannel WB, Wilson PW. Risk factors that attenuate the female coronary disease advantage. Arch Intern Med 1995; 155: 57–61

ANNEXURES

ANNEXURE - 1

PROFORMA

SERIAL NUMBER:

NAME:

AGE:

SEX:

IP.NO:

Date of Admission:

Date of Discharge:

CHIEF COMPLAINTS:

HISTORY OF PRESENTING ILLNESS:

CHEST PAIN	SWEATING	DYSPNEA	VOMITING	PALPITATION

PAST HISTORY:

DM	○ YES ○ NO
SHT	○ YES ○ NO
CAD	○ YES ○ NO
RHD/CHD	○ YES ○ NO
CVA	○ YES ○ NO
PVD	○ YES ○ NO
LIVER/RENAL FAILURE	○ YES ○ NO

PERSONAL HISTORY:

DIET	○ VEG ○ NONVEG
TOBACCO	○ SMOKE ○ CHEW ○ NO
ALCOHOLIC	○ YES ○ NO

MENSTRUAL HISTORY [For Female Patients Only]:

MENOPAUSAL	○ PRE ○ POST

DRUG HISTORY:

OCP/HRT	OTHERS

GENERAL EXAMINATION:

BMI	HT: WT:
VITALS	PR: BP: RR:

SYSTEM EXAMINATION:

CVS	
RS	
P/A	
CNS	

INVESTIGATIONS:

CBC

RBS

RFT

LFT

LIPID PROFILE

CPK-MB

TROPONIN-T

PLASMA FIBRINOGEN

ECG

CXR

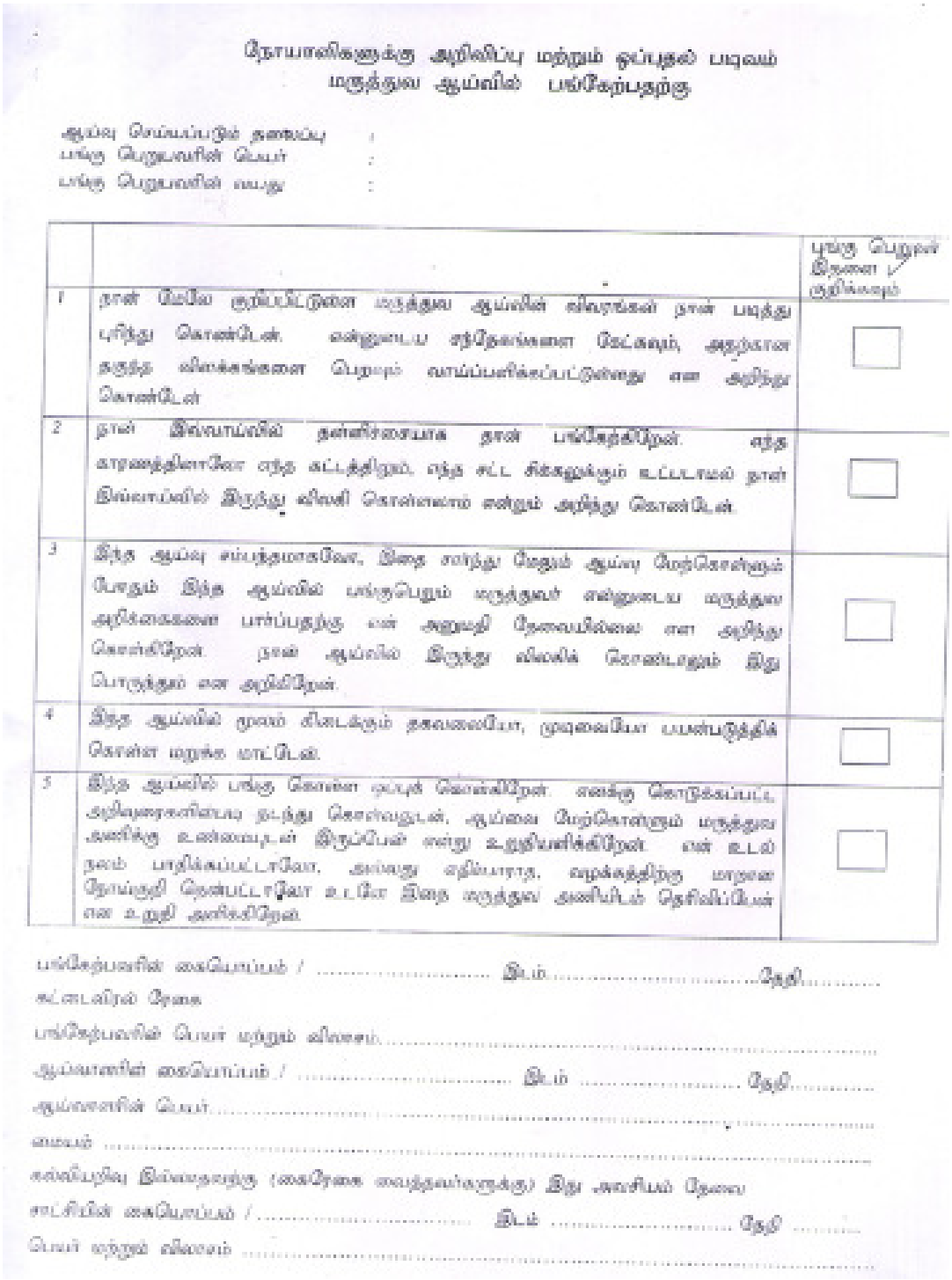
TREATMENT:

OUTCOME:

Outcome	○ RECOVERY ○ DEATH

ANNEXURE – 2

PATIENT CONSENT FORM



நோயாளிகளுக்கு அறிவிப்பு மற்றும் ஒப்புதல் படிவம்
மருத்துவ ஆய்வில் பங்கேற்பதற்கு

ஆய்வு செய்யப்படும் தலைப்பு :
பங்கு பெறுபவரின் பெயர் :
பங்கு பெறுபவரின் வயது :

		புரிந்து பெறுபவர் இங்கனம் குறிக்கவும்
1	நான் மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்கள் நான் படித்து புரிந்து கொண்டேன். என்னுடைய சந்தேகங்களை கேட்கவும், அதற்கான தகுந்த விளக்கங்களை பெறவும் வாய்ப்பளிக்கப்பட்டுள்ளது என அறிந்து கொண்டேன்	☐
2	நான் இவ்வாய்வில் தன்னிச்சையாக தான் பங்கேற்கிறேன். எந்த காரணத்திலாவது எந்த கட்டத்திலும், எந்த சட்ட சிக்கலுக்கும் உட்படாமல் நான் இவ்வாய்வில் இருந்து விலகி கொள்ளலாம் என்றும் அறிந்து கொண்டேன்.	☐
3	இந்த ஆய்வு சம்பந்தமாகவோ, இதை சார்ந்து வேறும் ஆய்வு மேற்கொள்ளும் போதும் இந்த ஆய்வில் பங்குபெறும் மருத்துவர் என்னுடைய மருத்துவ அறிக்கைகளை பார்ப்பதற்கு என் அனுமதி தேவையில்லை என அறிந்து கொள்கிறேன். நான் ஆய்வில் இருந்து விலகிக் கொண்டாலும் இது பொருந்தும் என அறிகிறேன்.	☐
4	இந்த ஆய்வில் மூலம் கிடைக்கும் தகவல்களோ, முடிவுகளோ பயன்படுத்திக் கொள்ள மறுக்க மாட்டேன்.	☐
5	இந்த ஆய்வில் பங்கு கொள்ள முடிவு கொள்கிறேன். எனக்கு கொடுக்கப்பட்ட அறிவுரைகளின்படி நடந்து கொள்வதுடன், ஆய்வை மேற்கொள்ளும் மருத்துவ அணிக்கு உண்மையுடன் இருப்பேன் என்று உறுதியளிக்கிறேன். என் உடல் நலம் பாதிக்கப்பட்டாலோ, அல்லது எதிர்பாராத, வழக்கத்திற்கு மாறான நோய்நிலை ஏற்பட்டாலோ உடனே இதை மருத்துவ அணியிடம் தெரிவிப்பேன் என உறுதி அளிக்கிறேன்.	☐

பங்கேற்பவரின் கையொப்பம் / ..... இடம்..... தேதி.....
சட்டபூர்வ நேரம்
பங்கேற்பவரின் பெயர் மற்றும் விலாசம்.....
ஆய்வாளரின் கையொப்பம் / ..... இடம் ..... தேதி.....
ஆய்வாளரின் பெயர்.....
வயது .....
சம்மதிப்பது இல்லாதவர்க்கு (கையொப்பம் வைக்கவோ வைத்தவருக்கு) இது அவசியம் தேவை
சாட்சியின் கையொப்பம் / ..... இடம் ..... தேதி .....
பெயர் மற்றும் விலாசம் .....

INFORMED CONSENT FORM

Study Title _____

Study Number _____

Subject's Full Name _____

Date of Birth/Age _____

Address _____

1. I confirm that I have read and understood the information sheet dated for the above study and have had the opportunity to ask questions.
   OR I have been explained the nature of the study by the Investigator and had the opportunity to ask questions

2. I understand that my participation in the study is voluntary and that I am free to withdraw at any time, without giving any reason and without my medical care or legal rights being affected.

3. I understand that the sponsor of the clinical trial/project, others working on the Sponsor's behalf, the Ethics Committee and the regulatory authorities will not need my permission to look at my health records both in respect of the current study and any further research that may be conducted in relation to it, even if I withdraw from the trial. However, I understand that my Identity will not be revealed in any information released to third parties or published.

4. I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s)

5. I agree to take part in the above study

Signature (or Thumb impression) of the Subject/Legally Acceptable Representative: _____

Signatory's Name _____ Date _____

Signature of the Investigator _____ Date _____

Study Investigator's Name _____

Signature of the Witness _____ Date _____

Name of the Witness

ANNEXURE - 3

MASTER CHART

SL.NO	NAME	AGE	SEX	IP NO	SYMPTOMS	MENOPAUSAL	BMI	LIPID PROFILE				CPK-MB	TROPONIN-T	PLASMIA FIBRO		ECG	TREATMENT	OUTCOME
								TC	LDL	TGL	HDL			TV	CV			
1	Suresh	37	Male	24472	Typical	NA	23	198	164	228	34	124	ND	>450	280	STEMI/Extensive AWMI	Thrombolysed	Recovery
2	Selvam	39	Male	24509	Typical	NA	32	296	204	328	42	128	ND	>450	280	STEMI/Extensive AWMI	Thrombolysed	Recovery
3	Gnaiah	69	Male	24627	Atypical	NA	23	194	156	217	41	116	ND	434	334.1	STEMI/IWMI	Thrombolysed	Recovery
4	Yesudass	62	Male	24816	Atypical	NA	24	198	174	218	38	68	ND	375	234.1	STEMI/ALMI	Thrombolysed	Recovery
5	Shahul Hameed	48	Male	25134	Typical	NA	28	212	181	228	39	119	ND	>450	280	STEMI/AWMI	Thrombolysed	Recovery
6	Krishnan	51	Male	25229	Typical	NA	28	221	195	292	45	89	ND	414	280	STEMI/AWMI	Thrombolysed	Recovery
7	Masilamani	67	Male	25258	Atypical	NA	21	254	145	227	47	77	ND	385	280	STEMI/IWMI/RVMI	Thrombolysed	Recovery
8	Muthu	52	Male	25530	Typical	NA	27	178	158	228	38	87	ND	402	348.4	STEMI/ALMI	Thrombolysed	Recovery
9	PaulRaj	57	Male	25774	Atypical	NA	27	224	186	294	39	128	+ve	434	334.1	NSTEMI/IWMI	Not Thrombolysed	Recovery
10	Rajamani	54	Male	26168	Atypical	NA	22	228	182	282	42	82	ND	414	280	STEMI/ASMI	Thrombolysed	Recovery
11	Arumugam	70	Male	26733	Typical	NA	22	204	166	224	42	78	+ve	448	250	NSTEMI/AWMI	Not Thrombolysed	Recovery
12	Kulanthaivel	58	Male	26851	Typical	NA	24	281	161	312	48	68	ND	398	280	STEMI/AWMI	Thrombolysed	Recovery
13	Mahalingam	52	Male	27392	Typical	NA	29	192	164	246	51	82	ND	>450	280	STEMI/ASMI	Thrombolysed	Recovery
14	Madasamy	66	Male	27471	Typical	NA	21	214	154	176	37	76	ND	>450	341	STEMI/AWMI	Thrombolysed	Recovery
15	Eswaran	50	Male	27535	Typical	NA	27	183	175	271	37	73	ND	421	280	STEMI/AWMI	Thrombolysed	Recovery
16	Mariappan	51	Male	28622	Typical	NA	22	206	173	237	41	82	ND	402	250	STEMI/AWMI	Thrombolysed	Recovery
17	Shajahan	43	Male	28915	Typical	NA	33	297	199	346	37	138	ND	>450	280	STEMI/AWMI	Thrombolysed	Recovery
18	Balakrishnan	52	Male	29477	Typical	NA	29	273	189	296	37	96	ND	441	250	STEMI/AWMI	Thrombolysed	Death
19	Krishnamoorthi	52	Male	29820	Typical	NA	23	191	180	210	38	92	ND	414	250	STEMI/IWMI/RVMI	Thrombolysed	Recovery
20	Jalaludeen	61	Male	30027	Atypical	NA	27	271	192	294	47	97	ND	388	250	STEMI/ASMI	Thrombolysed	Recovery
21	Esak	52	Male	30674	Typical	NA	29	273	184	296	43	94	ND	358	250	STEMI/AWMI	Thrombolysed	Recovery
22	Subbiah	73	Male	30968	Typical	NA	24	203	165	285	40	85	ND	427	250	STEMI/AWMI	Thrombolysed	Recovery
23	Ramamoorthi	59	Male	30983	Typical	NA	22	222	181	269	39	68	ND	>450	341.1	STEMI/IWMI/RVMI	Thrombolysed	Recovery
24	Ganesan	62	Male	31236	Typical	NA	23	220	182	268	42	88	ND	414	341.1	STEMI/AWMI	Thrombolysed	Recovery
25	Papanasam	55	Male	31296	Typical	NA	23	207	177	289	45	87	ND	421	341.1	STEMI/IWMI/RVMI	Thrombolysed	Recovery
26	Pitchumani	49	Male	32723	Typical	NA	28	274	194	317	37	97	ND	402	250	STEMI/AWMI	Thrombolysed	Recovery
27	Murugan	52	Male	33059	Atypical	NA	23	204	156	243	43	101	ND	394	250	STEMI/ASMI	Thrombolysed	Recovery
28	Thiagarajan	54	Male	35216	Typical	NA	24	197	161	195	41	96	ND	414	341.1	STEMI/ASMI	Thrombolysed	Recovery
29	Karuppasamy	68	Male	36845	Atypical	NA	22	216	163	205	40	67	ND	421	341.1	STEMI/AWMI	Thrombolysed	Recovery
30	Ayyakutty	72	Male	40239	Typical	NA	22	242	187	252	35	93	ND	368	341.1	STEMI/IWMI	Thrombolysed	Recovery
31	Subramanian	61	Male	40626	Typical	NA	21	221	163	247	37	118	ND	>450	280	STEMI/IW/RVMI	Thrombolysed	Recovery
32	Vallinayagam	36	Male	41253	Typical	NA	23	199	149	229	39	88	ND	>450	280	STEMI/IWMI/RVMI	Thrombolysed	Recovery
33	Saimon	57	Male	42683	Typical	NA	26	268	194	296	43	99	+ve	375	234.1	NSTEMI/AWMI	Not Thrombolysed	Recovery
34	Narayanan	58	Male	42934	Typical	NA	23	214	98	246	39	76	+ve	427	280	NSTEMI/IWMI	Not Thrombolysed	Recovery
35	Nagoor Merasha	63	Male	47432	Atypical	NA	24	257	187	269	44	139	ND	>450	280	STEMI/ASMI	Thrombolysed	Recovery
36	Santha	45	Female	25826	Typical	PRE	29	214	198	272	31	92	ND	>450	341	STEMI/Extensive AWMI	Thrombolysed	Recovery
37	Sankaraammal	70	Female	30453	Atypical	POST	19	219	96	198	38	76	ND	341	250	STEMI/AWMI	Thrombolysed	Recovery
38	Thamburatty	62	Female	30989	Atypical	POST	27	244	178	294	39	158	ND	398	250	STEMI/IWMI/RVMI	Thrombolysed	Recovery
39	Pushpam	67	Female	31867	Atypical	POST	24	201	166	176	37	110	ND	421	250	STEMI/ASMI	Thrombolysed	Recovery
40	Thangamani	62	Female	31962	Atypical	POST	27	218	162	214	37	44	+ve	414	250	NSTEMI/AWMI	Not Thrombolysed	Recovery
41	Kuttiammal	65	Female	32927	Atypical	POST	28	286	145	257	32	52	+ve	358	250	NSTEMI/IWMI	Not Thrombolysed	Recovery
41	Kuttiammal	65	Female	32927	Atypical	POST	28	286	145	257	32	52	+ve	358	250	NSTEMI/IWMI	Not Thrombolysed	Recovery
42	Ganapathiammal	64	Female	33199	Typical	POST	21	199	179	204	41	79	ND	414	250	STEMI/IWMI	Thrombolysed	Recovery
43	Peratchi	66	Female	33199	Typical	POST	23	177	95	203	46	161	ND	408	280	STEMI/AWMI	Thrombolysed	Recovery
44	Yesumariyal	68	Female	33314	Atypical	POST	29	268	205	314	42	142	ND	429	250	STEMI/ASMI	Thrombolysed	Recovery
45	Hameeda Fathima	67	Female	34012	Atypical	POST	32	277	216	303	44	154	ND	>450	250	STEMI/AWMI	Thrombolysed	Recovery
46	Rani	61	Female	34276	Typical	POST	32	294	188	312	28	124	ND	>450	250	STEMI/Extensive AWMI	Thrombolysed	Death
47	Chellammal	68	Female	39948	Atypical	POST	21	194	93	207	33	82	+ve	402	250	NSTEMI/ASMI	Not Thrombolysed	Recovery
48	Anujothiammal	66	Female	41309	Atypical	POST	21	228	149	252	37	121	ND	>450	280	STEMI/Extensive AWMI	Thrombolysed	Recovery
49	Pappammal	65	Female	41422	Atypical	POST	23	182	97	171	40	61	ND	414	341	STEMI/IWMI/RVMI	Thrombolysed	Recovery
50	Alamelu	60	Female	41699	Typical	POST	21	168	99	194	41	74	ND	421	341	STEMI/AWMI	Thrombolysed	Recovery
51	Gomathy	40	Female	42343	Typical	PRE	27	211	163	189	39	82	ND	427	250	STEMI/AWMI	Thrombolysed	Recovery
52	Lakshmi	57	Female	42662	Atypical	POST	26	224	164	298	36	89	ND	348	250	STEMI/ALMI	Thrombolysed	Recovery
53	Vellaiammal	75	Female	43225	Atypical	POST	29	294	172	202	37	78	+ve	>450	250	NSTEMI/AWMI	Not Thrombolysed	Recovery
54	Sivakami	73	Female	43300	Atypical	POST	23	186	132	188	41	68	+ve	441	250	NSTEMI/IWMI	Not Thrombolysed	Recovery
55	Valliammal	67	Female	44495	Typical	POST	19	241	201	317	32	124	ND	>450	341.1	STEMI/AWMI	Thrombolysed	Death
56	Saraswathi	45	Female	44683	Atypical	PRE	32	228	201	264	36	96	ND	>450	250	STEMI/ASMI	Thrombolysed	Recovery
57	Seethaiammal	66	Female	44683	Typical	POST	21	208	91	168	44	68	ND	394	250	STEMI/AWMI	Thrombolysed	Recovery
58	Mahalakshmi	62	Female	45046	Typical	POST	28	218	194	242	31	82	ND	448	250	STEMI/ASMI	Thrombolysed	Recovery
59	Oorkali	64	Female	45844	Atypical	POST	22	181	156	215	44	88	ND	421	341	STEMI/IWMI	Thrombolysed	Recovery
60	Pathirakali	70	Female	46811	Typical	POST	20	268	204	323	42	118	ND	>450	341	STEMI/Extensive AWMI	Thrombolysed	Death
61	Vasantha	64	Female	46997	Atypical	POST	29	262	201	299	40	96	ND	375	234.1	STEMI/ASMI	Thrombolysed	Recovery
62	Sheikammal	72	Female	47057	Atypical	POST	28	294	222	346	45	119	ND	427	250	STEMI/ASMI	Thrombolysed	Recovery
63	Shanmugathai	70	Female	47253	Atypical	POST	29	228	186	288	39	118	ND	>450	250	STEMI/AWMI	Thrombolysed	Recovery
64	Pitchaiammal	71	Female	47432	Typical	POST	22	216	178	206	42	124	ND	>450	280	STEMI/AWMI	Thrombolysed	Recovery
65	Krishnammal	72	Female	47839	Atypical	POST	23	191	154	182	36	116	ND	398	280	STEMI/ASMI	Thrombolysed	Recovery
66	Lalitha	61	Female	48223	Atypical	POST	24	206	169	272	38	128	ND	>450	250	STEMI/ASMI	Thrombolysed	Recovery
67	Rajeswari	62	Female	48315	Typical	POST	27	268	189	292	34	138	ND	>450	250	STEMI/Extensive AWMI	Thrombolysed	Death
68	Ramalakshmi	70	Female	68256	Atypical	POST	21	236	187	206	34	42	+ve	388	250	NSTEMI/IWMI	Not Thrombolysed	Recovery
69	Athisayamari	69	Female	71123	Atypical	POST	22	260	179	216	38	38	+ve	>450	341	NSTEMI/AWMI	Not Thrombolysed	Recovery
70	Asanammal	60	Female	71241	Atypical	POST	23	220	130	170	42	74	+ve	347	250	NSTEMI/AWMI	Not Thrombolysed	Recovery

ANNEXURE - 4

KEY TO MASTER CHART

BMI	Body Mass Index
TC	Total Cholesterol
LDL	Low Density Lipo Protein
TGL	Triglyceride
HDL	High Density Lipo Protein
CPK-MB	Creatinine Phospo Kinase – MB
STEMI	ST Elevation Myocardial Infarction
NSTEMI	Non ST Elevation Myocardial Infarction
AWMI	Anterior Wall Myocardial Infarction
IWMI	Inferior Wall Myocardial Infarction
ASMI	Antero Septal Myocardial Infarction
ALMI	Antero Lateral Myocardial Infarction
RVMI	Right Ventricle Myocardial Infarction

ANNEXURE - 5

LIST OF ABBREVIATIONS

ACC - American college of cardiology

ACS - Acute coronary syndrome

AHA - American heart association

ASMI - Antero septal myocardial infarction

AWMI - Anterior wall myocardial infarction

BMI - Body mass index

BP - Blood pressure

CAD - Coronary artery disease

CHD-Congenital Heart Disease

CPK – MB – Creatine Phospho Kinase - MB

CVA-Cerebrovascular Accident

CVD - Cardio vascular disease

CXR –Chest X Ray

DM- Diabetes Mellitus

ECG - Electrocardiogram

HDL - High density lipoprotein

HLMI - High lateral myocardial infarction

HRT-Hormone Replacement Therapy

ICAM-Intracellular adhesion molecule-1

IHD - Ischemic heart disease

INR - International normalized ratio

IWMI - Inferior wall myocardial infarction

JNC-Joint National Committee

LDL - Low density lipoprotein

MI - Myocardial infarction

NCEP-National Cholesterol Education Programme

OCP- Oral Contraceptive Pills

PCI - Percutaneous coronary intervention

PVD-Peripheral vascular disease

PWMI - Posterior wall myocardial infarction

RHD-Rheumatic Heart Disease

RVMI - Right ventricular myocardial infarction

RWMA - Regional wall motion abnormality

SHT-Systemic Hyper Tension

STEMI - ST elevation MI

UA - Unstable angina

WHO-World Health Organization